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October 1935

DEPARTMENT OF THE INTERIOR

UNITED STATES BUREAU OF MINES
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INFORMATION CIRCULAR

REVIEW OF LITERATURE ON EFFECTS OF BREATHING DUSTS WITH SPECIAL REFERENCE TO SILICOSIS

PART III-A

CHAPTER 5. ECONOMIC AND LEGAL ASPECTS OF DUST DISEASE IN INDUSTRY (SECTIONS 1 AND 2)

BY

D. HARRINGTON AND SARA J. DAVENPORT

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REVIEW OF LITERATURE ON EFFECTS OF BREATHING DUSTS WITH SPECIAL REFERENCE TO SILICOSIS[1]

PART III-A

By D. Harrington[2] and Sara J. Davenport[3]

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This circular presents Part III-A of a series reviewing the literature on effects of breathing dusts with special reference to silicosis; it deals with the economic and legal aspects of dust diseases in industry; Part III-B will contain data on the status and cost of compensation for silicosis. Parts I and II of the series have been issued as Information Circulars 6835, 6840, and 6848; Part I defines and classifies dusts, indicates sources of exposure, and describes the physiological effects of breathing dusts; Part II-A discusses the principal dust factors producing pulmonary pathology and methods of determination of dust in air; and Part II-B presents data on the engineering and medical control in the prevention of dust diseases and general recommendations for their control in industry.

A summary and general conclusions will complete the series.

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[1] The Bureau of Mines will welcome reprinting of this information circular, provided the following footnote acknowledgment is used: "Reprinted from U.S. Bureau of Mines Information Circular 6857."
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CHAPTER V. ECONOMIC AND LEGAL ASPECTS OF DUST DISEASE IN INDUSTRY

Section 1.- The Economic Menace of Dust Diseases in Industry

Recently dust and dust diseases -- especially silicosis -- have jumped from obscure, scarcely recognized diseases hidden for centuries in the chests of workers in various dusty industries to front-page headlines in the daily press and to wide discussion in the technical journals of the United States and other countries. This unusual news value is not due primarily to the sudden realization of the presence in our industrial midst of a great health hazard but to a rude awakening to the fact that a very important economic hazard is menacing industry, even to the extent in some instances of threatening its very existence. Such headlines and statements as the following indicate the seriousness of the situation:

Silicosis Damage Suits Reach Illinois Courts

The $25,000-damage suit of a former employee of a silica company has been in progress in a circuit court in Illinois. The plaintiff alleges he contracted silicosis while employed by the company.

Meanwhile, 2 similar suits, each asking $50,000 damages, brought by former workers of another silica company, were dismissed by the judge. It was said that a settlement had been effected out of court (377).

28 Alleged Silicosis Victims Ask Damages - Total of $982,500 Demanded

Damages totaling $982,500 are being sought in 28 separate suits filed by employees and former employees of a silica company in Illinois, following their alleged contraction of silicosis while working in the plant and silica-sand quarries of the company.

Included among the plaintiffs are 10 who are demanding damages of $25,000, $50,000, $37,500, $35,000, $25,000, $10,000, $10,000, $45,000, $20,000, and $25,000.

The almost wholesale filing of the suits follows the recent decisions of courts in Illinois wherein former workers who contracted silicosis were awarded substantial claims for damages from silica-sand operators in that vicinity (378).

Awards Silicosis Victim $10,000 in Damage Suit

A plaintiff was awarded $10,000 damages recently by a circuit-court jury as the result of a suit in which he alleged that he had contracted silicosis during his employment with a silica-sand company.

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This suit is the first ever prosecuted under the workmen's compensation law in Illinois involving the disease (379).

Court Awards Silicosis Victim $17,000 Damages

A patient in a sanitarium suffering from silicosis was awarded $17,000 damages against his former employer, a silica-sand company of Illinois, by a circuit-court jury on February 16. The plaintiff sued for $25,000, and the case had been on trial for more than 2 weeks. Counsel for the defense moved that the verdict be set aside and filed a motion for a new trial. Both were denied. An appeal to the Illinois Supreme Court is pending.

A few months ago another employee of the company obtained a $10,000 judgment in a similar suit. Only recently the judge denied the company a new trial. This case, too, is to be appealed to the supreme court, it is reported (380).

Victim Sues to Collect Insurance for Silicosis

A former employee of a silica plant has filed suit against the _____ Life Insurance Co., asking $5,000, alleging that he is entitled to that settlement on account of a total-disability clause in his policy. He claims to have contracted silicosis while working at the plant and has been totally disabled as a result (381).

Silicosis in Certain of Its Legal Aspects

At the present time there are hundreds of suits against industrial concerns throughout the country, predicated on silicosis. In the State of Illinois approximately 200 silicosis cases are pending in the common-law courts. Because of the unemployment situation and the activity of ambulance chasers there probably will be many more, with the resultant closing of industrial plants and a vast economic loss (382).

In Missouri 8 suits for damages from the contraction of silicosis brought against a silica company have been settled out of court for $36,500 (383).

Silicosis and Silicotuberculosis

For instance, in the St. Louis Post-Dispatch of March 19 last it was stated that there were $5,000,000 of claims against a mining company operating in Missouri and that approximately $500,000 had been expended in settling some of these claims. One company (gravel-crushing) had 100 claims among 175 workers; 50 of these had filed suit. There was merit in one fourth of the claims.

Hundreds of claims by workers in lime quarries and lime manufacture and cement have been filed in Missouri. In Illinois 23 suits were filed in 2 days against an abrasive company.

The foregoing gives some idea of the prevalence of silicosis among silica workers. The importance of this subject as an industrial problem not only to the workers but also to the employers is glaringly apparent, and it must be met for the sake of both (384).

Lawyer Tells How Silicosis Suits Developed Here After Friend Died of Disease--Number of Rock-Dust Industries in State Help Explain Hundreds of Cases--Alleged Negligence Basis of Claims

The silicosis damage suit in which the State Supreme Court last Wednesday refused a writ to prohibit trial in St. Louis Circuit Court is one of many constituting a comparatively recent phase of litigation in St. Louis courts.

About 300 such suits are pending. As was told recently in the Post-Dispatch, the total amount represented by these suits and additional claims in the hands of lawyers but not yet sued upon was estimated at $12,000,000 by an investigator for one defendant corporation. The unsuccessful application to the supreme court for a writ of prohibition was made by the defendant company in a number of pending suits. * * *.

Another incident, an unusual defense move which reflects the highly controversial nature of the litigation, was the indictment a few days ago of the attorney. He was charged with "moving, stirring up, and inciting" four persons to file damage suits against the company, which he denies. * * *.

In a number of cases judgments have been returned by trial juries for plaintiffs in amounts up to $20,000, and in some cases the verdict has been for the employing corporation. The validity of each claim rests on proof of two facts, first, that the worker has, or had, silicosis, and, second, that it was contracted through the negligence of the employer. In some cases where the worker has died the claimants are surviving relatives. A charge frequently made against employers is that they have neglected to provide the safety devices and measures required by State law. The silicosis suits have been filed in greatest number in the last 3 years.

An attorney, who has specialized in cases of this kind, gave a Post-Dispatch reporter an interesting account of how his interest was aroused and of his exhaustive study of the disease. Since he first handled a silicosis case 3 years ago he has disposed of about 200 cases for claimants by settlement out of court and 20 by trial. He has 600 to 700 claims now in hand, he said. * * *.

"I have never solicited any of these cases", he continued. "They are brought to me in great numbers, not only by the affected persons, but also by other lawyers. It is possible that some lawyers may solicit such cases and then bring them to me. I don't know. If a man has silicosis which appears to have been contracted through the negligence of his employers I try to get compensation for him. Otherwise I do not take the case" (385).

Cement Plants Fight Silicosis Racket

Does employment in or about a cement mill predispose workers to silicosis or tuberculosis?

That's the question that the cement industry answers in the negative, while certain plaintiffs, appearing more numerous of late, are proceeding to test the issue in the courts.

The first "silicosis" case against a portland-cement manufacturer in Illinois came to trial recently in the circuit court at Chicago. After a solid week of legal combat the case was terminated on March 3, on completion of the plaintiff's evidence, by the court granting the defendant's motion for an instructed verdict.

The court held that the plaintiff had failed to make a prima-facie case. In plain language, the plaintiff's case collapsed in utter defeat before presentation of any evidence whatsoever by the defendant.

Almost simultaneously, the first two "silicosis" cases against a Missouri cement-manufacturing company came to trial in the circuit court at St. Louis and after hard-fought legal contests resulted in victory for the two plaintiffs, in one case carrying a judgment of $25,000 and in the other, $15,000. These suits are sure to be appealed.

The winning of these cases by plaintiffs led to the immediate filing of a number of further suits against the defendant. Concerns in the vicinity other than cement manufacturers face an aggregate of some 300 suits of the same general character. Distinction may be made in the case of the cement manufacturers because of the fact that their dust is known to contain only about 1 percent of free silica and that dust concentrations are far below the determined "danger" point. Consequently in the minds of most of the cement fraternity these suits are purely rackets and must be dealt with as such. * * *.

The industrial-disease racket, though it sprang up like a mushroom, has developed with the strength of a mighty tree to the point where it bids fair to make the liquor, kidnapping, and even the labor rackets look insignificant by comparison of the amounts involved, the losses caused to the public, and the enormous profits received and the small risks incurred by the racketeer (386).

Silicosis Racketeering in Missouri

The Editor: Have read "Cement Plants Fight Silicosis Racket" in your May issue. This is the best exposition I have yet seen in print of what is actually going on. The article gets right down to cases.

Everything therein concerning Missouri conditions is correct, and the writer could have gone still farther in the matter had he so wished.

The latest victim in this State is the fire-clay industry * * * a member of which is being sued for $25,000. As usual the "runner" or hobo attorney picked out the one with the most money. If the "plaintiff" has worked for several companies, as is sometimes the case, the snitch lawyer picks out the company most likely to come through with the money.

We have seven of these, with a mill that has been dustless for years; we got a hung jury on the first and most pitiful case (permanently crippled by syphilitic arthritis, no silicosis). Six of the remaining cases then pulled out voluntarily to the great disgust of the snitches. The other two will probably not come to trial.

As the chemist for one of the principal offenders in St. Louis remarked: "To hell with the chemical analysis; all we need is dust." Any dust will do.

Missouri is one State that industry had better keep out of, for we have no legal protection whatever from these racketeers (387).

"A Missouri Victim."

Silicosis and Mining

Silicosis damage suits reared their heads again in St. Louis last week in the form of the suit of _____ versus _____ Co. A new term is being used by attacking plaintiffs and their attorneys in bringing suits against mining companies, quarries, stone plants, process plants, and any concern where the slightest dust occurs.

In the St. Louis area there are some 2,000 suits pending * * *.

Seeking a more "comprehensive" term, plaintiffs are now using the term "pneumoconiosis", which one attorney described as "covering everything from a nose sniffle to death from tuberculosis."

St. Louis is noted for high damage juries, usually more than sympathetic toward anyone suing a corporation, and defense attorneys allege that a majority of the suits are part of a "racket" instituted by a ring of "lawyers."

Plaintiffs' attorneys contradict these allegations and assert that expert testimony will prove their cases when the 2,000 suits are terminated.

Confined to a great degree to Missouri at present, the suits give warning of their spreading to other points (388).

Lime Employee Wins $22,500 Silicosis Suit - Suits Pending for $155,000

A motion to set aside the appointment of a receiver for a lime and cement company was upheld February 20 in circuit court. This company had been thrown into receivership February 12 to protect its assets from being wiped out through damage suits brought by former employees who claim to have contracted silicosis while in the company's employ. The president of the company had been appointed receiver for the company on the petition of an unsecured creditor and with the company's consent. The circuit court had also granted an injunction restraining the holder of a $22,500 judgment against the company from obtaining an execution against its property. The injunction also restrained the plaintiffs in other silicosis suits against the company from proceeding with the prosecution of such legal actions and prohibited the filing of a new damage suit against the company. The aggregate amount sought in pending silicosis suits is reported to be $155,000.

The company's assets are said to greatly exceed its liabilities, but its credit had been greatly injured by reason of the judgment, the other suits which are pending, and still others that may be filed by former employees, according to the petition.

During the past 18 months several hundred suits have been filed in the State and Federal courts in Missouri by men and women who claim to have contracted silicosis while formerly employed. The aggregate amount sought in these various suits is placed at $15,000,000, and it is admitted that they would wipe out a number of industrial concerns if all of the plaintiffs were able to obtain judgments for the maximum amounts they are seeking. Lead, cement, and sand companies, glass plants, and flour mills have been among the defendants named in those wholesale suits. In each case the employer is charged with negligence in failing to take proper precautions to prevent employees from being affected by silica poisoning (389).

Silicosis Suit Against Missouri Firm Dismissed

A silicosis suit for $30,000 against a glass company was dismissed February 25 by the Federal judge at St. Louis. The plaintiff said that he had X-ray pictures of his lungs taken at the suggestion of a lawyer. A stipulation which he signed November 1933 at the office of the company was admitted as evidence. At that time he was paid $100 (390).

Silicosis Verdict Awarded Former Plant Employee

A verdict of $10,000 was returned by a jury March 7 in a Missouri circuit court in favor of an employee of a sand company. The award was for personal injuries he was alleged to have suffered from contraction of silicosis while in the company's employ. The plaintiff was employed by the company 12 years ago (391).

Two Silicosis Motions Are Denied by Court

Supreme Court Justice _____ yesterday denied motions of a company to dismiss two $100,000 silicosis complaints pending against it. Two similar motions were denied the previous day in other silicosis actions by Justice _____.

The plaintiffs involved in yesterday's decisions * * * allege they contracted a lung disease as a result of sand-blasting operations.

"Whether the disease contracted by the plaintiff was an accidental injury for which compensation is provided will probably depend upon the testimony of experts and may become a question of fact which can only be determined after trial", Justice _____ decided (392).

Appeals Silicosis Case Court Decision--Company Seeks to Set Aside Order Denying Dismissal

Notice of appeal to the appellate division from a supreme-court decision upholding a plaintiff's right to maintain a common-law action for damages in a silicosis case was filed yesterday by the _____ Co.

The plaintiff is seeking $100,000 damages, alleging he contracted the lung disease called "silicosis" while employed in sand-blasting. The appeal is from an order of Justice _____ issued July 20 denying a motion made by the company for dismissal of the complaint.

Several silicosis suits are awaiting trial, the _____ Co. being defendant in but one (393).

Silicosis in the Courts of New York

It is estimated that several hundred cases asking more than $1,000,000 in damages have been filed in the New York State courts on behalf of workers claiming to have contracted silicosis in the course of their employment (394).

Silicosis in Rochester

Not long ago a deluge of common-law suits for negligence fell upon various industrial employers in Rochester. It came with the suddenness of a tropical hurricane, taking most of them by surprise.

In the beginning it was alleged that the injury was due to "silicosis." Most employers who had heard of this disease at all thought of it chiefly as a disease of miners and quarrymen, with little thought of the possibility that it might arise in a great variety of manufacturing plants, and least of all in a transportation company.

It soon became apparent that someone had been industriously searching the list of employees and ex-employees of a number of companies for those who had died of tuberculosis or other pulmonary diseases, or for those who were in tuberculosis sanatoria, and later for those who might be expected to have silicosis. A large number of these men were given preliminary examinations by one physician on the basis of whose findings suits were filed by the dozen, nearly all being represented by one attorney.

In October 1932 one of these cases went to a jury, which gave a verdict for the plaintiff awarding nearly $14,000 to the widow. In this case it was clearly shown in the evidence that the deceased had died from the rupture of an aortic aneurysm into the oesophagus, that this aneurysm was due to syphilis. It was conceded by the defense that the deceased had tuberculosis. The plaintiff's counsel brought in very weak evidence that silicosis was present; for instance one of his witnesses reported that the ash of the lung of the deceased contained 3.2 percent of silica, an amount which is not more than one seventh of the amount which may be found in the ash of normal lungs.

Following this triumphant demonstration of what a jury might do, Rochester resembled nothing so much as a barnyard just after the swoop of a chicken hawk. A large number of cases were reported to be settled out of court for sums ranging from $2,000 to $4,000. These received due notice from the press with the result that many workmen, mostly unemployed, hastened to be examined in the hope that they, too, might participate in the rapidly growing racket (395).

The Dust Problem and Silicosis

Notable evidence of forward thinking in connection with the health of workers was apparent in the attention given to dusty atmospheres and silicosis at the Annual Safety Congress and Exposition held last week at Chicago. The general subject of dust and silicosis warrants the close study of mining executives in the United States, perhaps more so now than at any time in the past. A case in point is that of a contractor driving a 3-mile tunnel who recently had more than 400 silicosis damage suits filed against him that exceeds $4,000,000 (396).

200 Silicosis Cases Barred From Court

The 200 or more suits instituted by workmen who claimed they were permanently injured by contracting silicosis, a lung disease, while working in the Hawk's Nest dam tunnel, were barred from the courts today by the State's highest tribunal.

The supreme court ruled the actions, for damages of about $5,000,000 were not filed soon enough or within the statute of limitations.

The workmen were employed in building a water-diversion tunnel for the Hawk's Nest hydroelectric project in New River. * * *.

The plaintiffs claimed they instituted action as soon as they "learned or had cause to suspect" they were suffering from silicosis. The company contended the suits were not filed within the 1-year time limits fixed by State law (397).

Silicosis in Court

Far-reaching effects are indicated in a recent decision in the United States Circuit Court of Appeals, Second Circuit, in a case concerning silicosis. A judgment of $13,903 was affirmed to the plaintiff - the widow of the victim. The justices say: "We think the verdict sufficiently established * * * because the defendant neglected to install a proper exhaust system * * * neglected to prevent the escape of dust by other means; neglected to supply Jacque with a respirator and to instruct him about the danger of contracting silicosis and how to avoid it. * * *. Irrespective of any statute, there is a duty at common law to warn and instruct employees and furnish them with means to avoid inhaling elements that are poisonous or injurious to their health, and there was proof that silica dust is such an element. * * *. In a case like the present the damage was not occasioned by disease inherent in the occupation, but because of neglect to furnish proper instruction and equipment for the prevention of any damage by silica dust."

Contractors engaged in rock drilling and tunneling operations cannot afford to take the risk of being subjected to similar suits by neglecting to protect their workmen from the hazard of silica dust. Dust traps for pneumatic drills have been successfully developed within the past few years that hold the dust concentration down to safe limits. Not only is the drill operator protected, but drilling proceeds at a much faster rate because of the dust-free hole maintained which does not clog the drill. If you want more information about it, ask for it (398).

Silicosis Insurance

A special recess legislative commission of the Massachusetts Legislature have completed a recommendation to force insurance companies writing workingmen's compensation insurance in Massachusetts to insure the employees in foundries and granite-cutting sheds to include the silicosis risk.

While conceding that the insurance companies were not without excuse for seeking to avoid carrying the risk, nevertheless it was held that they were not wholly justified in refusing the risk. It is proposed that in future employees in these industries be subject to annual physical examinations and that if they are found fit then the State Board of Labor and Industries is to issue a certificate of compliance, and insurance companies on the risk must insure. If the employee is unfit, then he will be forced to leave the industry, but will be open to old-age assistance benefits (399).

Surety Underwriters Organize Risk Pool

A group of 25 member companies of the National Bureau of Casualty and Surety Underwriters, transacting 85 percent of the workmen's compensation insurance business written by bureau members, has organized the Assigned Risk Pool * * *.

Although membership is restricted to member stock companies of the National Bureau, the pool is not a bureau enterprise. Management and control will be under the direction of a board of seven governors * * *.

According to its articles of agreement, the pool was established to protect member companies from extraordinary hazards involved in carrying compensation risks assigned to them by State authorities under provisions of voluntary plans for assignment of otherwise uninsurable risks. Hereafter any such risks assigned and accepted by members of the pool will be reinsured among member companies (400).

Insurance by State in Peril

California's compensation insurance structure has been placed in jeopardy through the invoking of a supreme-court decision, dormant since it was handed down in 1933, State insurance officials believed today.

The decision holds that compensation can be claimed whenever an accredited doctor diagnoses an ailment as due to previous employment of the patient. Under previous interpretations of the law, claims could not be filed after 6 months for injury or disease or after a year for a death benefit.

Attorney for the _____ Miners' Union invoked the decision 2 months ago when he filed the first of 60 claims. He has since said he will file 250 more.

A reserve of $3,500,000 would be required to satisfy these claims, Timothy A. Reardon, director of industrial relations, said. At present the reserve is $1,000,000 for all claims (401).

The seriousness of the silicosis situation from the standpoint of the insurance companies is indicated by the statement by Dick (402) that "in the State of Illinois today there are pending suits which if rendered in favor of the claimants will bankrupt several insurance companies. It matters not", he said, "judging from a few of the verdicts rendered, whether the disease be tuberculosis or bronchial asthma, if it be termed 'silicosis' the jury renders a verdict in favor of the employee despite the sworn testimony of known reputable clinicians or radiologists." Kreuscher (403) stated that he understood that one insurance company in Illinois had silicosis suits amounting to almost $500,000 and that there are pending in the United States suits aggregating $2,000,000 on the subject of silicosis alone. Sappington (404) found that his estimate of a year ago of about $35,000,000 in silicosis claims pending had increased until today it was $100,000,000, an increase in 1 year of approximately 200 percent.

According to an editorial in Pit and Quarry, March 1935 (405), it is but natural that so profitable a field as the exploitation of the fears of business men through the filing of damage suits alleging disease on the part of workmen employed in hazardous occupations should have attracted unscrupulous lawyers; it is also natural that most damage suits alleging contraction of silicosis or pneumoconiosis during employment should be looked upon by actual and potential defendants as attempts to extort money on spurious claims. The editorial, however, calls attention to the fact that there are genuine cases of both diseases initiated and developed as the result of employment in or near lung-destroying dust -- in truth many of them. Their number has increased alarmingly in recent years, and unless something is done by way of prevention they may become a very serious financial burden to industry. The following statement by the author of the editorial indicates his attitude toward the dust situation:

> The situation cannot be met in anything but an attitude of expediency and self-deception, if industrialists adhere to the thought that all, or even most of, such claims are spurious. The situation is one that must be faced by recognizing, first, that both diseases exist; secondly, that they are caused and aggravated by the presence of siliceous and other dangerous dusts; thirdly, that the employer is responsible for the damage resulting to employees working in or around such dusts; and, lastly, that there are means by which the dangers of exposure, disease, and the resulting litigation can be greatly reduced.
>
> The first two points are matters of fact which it is folly to deny, however great may be the number of ill-founded damage suits; their recognition requires a change of attitude on the part of many employers. The third factor is only too well-known to those who have been forced to defend themselves in silicosis suits, whether these were based on facts or misrepresentations. The point mentioned last -- namely, that there are means for lessening the hazards of silicosis and pneumoconiosis -- is the one to which we direct the attention of employers.

On previous occasions we have said that the prevention of suits for alleged silicosis damage is more a matter of mechanics than of legislation -- for some have sought the passage of laws relieving the employer from liability in silicosis cases. The installation of modern dust-collecting equipment, of which there are numerous efficient examples on the market, is the most effective means of stopping the growing number of silicosis damage suits. The use of such appliances reduces the exposure hazards, not perhaps to the minimum (which is a term of perfection and therefore unattainable), but at least to the point where it becomes extremely difficult, if not almost impossible, for a worker to contract the disease. In the few cases where the disease may develop the employer when sued can point to his equipment as evidence of his desire to prevent, as far as technological development has made possible, the contraction of the disease by his employees. No more formidable disproof of alleged contributory negligence on his part could be set up; certainly there could be no more effective evidence of his interest in his employees' welfare for presentation to a jury.

We again urge upon employers the wisdom of studying this problem intently in cases where the danger is present and of examining all available mechanical means for stopping silicosis litigation before the foundation of a claim is laid.

In introducing an article entitled "Plain Facts About Silicosis and Its Hazards to the Rock Products Industries", which appeared in the May 1935 issue of Rock Products, the editor (406) stated:

> Producers in this section (Illinois), naturally, have been victims of racketeering lawsuits, but on the other hand there have been, of course, authentic cases of silicosis. Here silicosis is a common topic of discussion; even the most poorly educated workmen and the children know something about it. The producers are anxious to do everything possible to protect their workmen from any hazard for every reason, humanitarian as well as economic.

The article mentioned above urges (406) every employer in the rock-products industry to acquire a general working knowledge of silicosis and the accompanying hazards, whether or not he believes the contraction of silicosis by his employees to be an actual possibility. It points out that some 86 industries working in dust of one kind or another are genuinely alarmed because suits are now pending against them with damage claims aggregating more than $50,000,000. The fact that there are no reasonable grounds for many of these suits does not alter the fact that they are a real menace and may be won by the plaintiffs unless intelligently defended. The present plague of silicosis damage suits in the dusty industries does not mean that silicosis has suddenly grown more prevalent or that its effects are more apparent. It is believed that few such suits would have been filed had not the depression closed factories and thrown men out of work; defendant employers have stated that most of the pending suits against them would be dropped if they could offer employment to the plaintiffs.

An editorial on silicosis in the Mining and Contracting Review (407), April 30, 1935, states that both the real silicosis cases and the fake racketeers are serious problems to employers of labor and that those who doubt this had best investigate.

The following statement regarding the menace of dust appeared on the front cover page of the April 1935 issue of the Aerologist (408):

> Astronomers used to tell us that the earth was slowly losing its heat, and in a few million years it would become cold and life extinct.
>
> Entomologists state that insect life is increasing rapidly, and the time will come when devouring hordes of things that fly, and creep, and crawl will devour the earth.
>
> We recall, however, that ancient cities and civilizations that have disappeared from the face of the earth can usually be found, if we dig deep enough in the accumulating dust of the ages.
>
> Expanding civilization, developing industry, disappearing forests, bring more wind and less rain, more frequent and more serious droughts, and dust storms that have become much more than a nuisance.
>
> Dust is the menace of civilization.

The following excellent summary of the dust situation is quoted from the March 14, 1935, issue of Engineering News-Record (409):

> The Menace of Silicosis
>
> Growing concern about the insidious rock-dust disease, silicosis, has progressively brought about a situation in which ignorance, weak efforts at control, and the threatening complication of racketeering combine to bedevil both industry and worker. Each day the situation grows worse, and it is high time that it be dealt with by determined action.
>
> Recent news reports carry significant information about silicosis damage suits. In Missouri an aroused mining industry has just obtained a number of grand-jury indictments against two lawyers active in silicosis cases on charges of barratry (inciting of lawsuits). A Missouri lime company is seeking receivership to protect its assets against silicosis judgments. A mine worker's union in Butte has petitioned the U.S. Senate for a sweeping investigation of the dust hazard in mines. And in the field of construction an able and reputable contractor is starting his third campaign of defense against a multitude of suits arising out of the driving of a 3-mile tunnel in West Virginia.

Industry's bewildered, helpless, and planless attitude toward silicosis is aggravated by scientific ignorance. Experts who have studied the disease for years agree only in recognizing that the hazard exists. Industry thus is faced with several major problems, chief among them knowledge of cause, development of effective means of prevention, and detection of the conditions that favor silicosis.

As to diagnosis and knowledge of cause, medical ignorance is great. Most authorities hold that silicosis is a fibrosis of the lungs caused by exposure to dusts containing high concentrations of free silica particles less than 10 microns in size. But a British geologist claims that the cause is not silica but sericite, a fibrous mineral of the muscovite family. Other authorities regard all dusts as potentially harmful. Some claim that silicosis cannot develop in a normal lung free of other infection, such as tuberculosis. There is disagreement as to the length of exposure required to contract the disease and the time required for its development. The U.S. Public Health Service states that there is danger in any atmosphere that contains more than 5,000,000 of the fine silica particles per cubic foot. And finally, medical experts claim that few doctors are capable of diagnosing silicosis.

Prevention is a field of even greater ignorance. Meetings called to consider methods of protecting rock workers almost uniformly fail to bring out definite proposals, and when some device or method is suggested by one speaker it is promptly condemned by another.

If rock dust causes silicosis, effective control of such dust should give protection. But what form of control? Thorough ventilation is advocated, but the first silicosis suits in construction come from an amply ventilated tunnel job. Free use of water is advised -- wet-drilling, spraying, and the like. Yet in the Rand mines in South Africa, where such measures are in common use, silicosis is rampant. Control of the drill dust at the drill hole is recommended, but there is no apparatus for this purpose in commercial production today, and even if it were available and effective it would still leave the dust created by blasting, mucking, and other rock-removal operations uncontrolled. Perhaps a solution is offered by the stringent specifications for respirators recently drafted by the Bureau of Mines and successfully met by three manufacturers. Respirators have so long been considered useless that the development of an effective mask is encouraging.

It may be that no single preventive measure is sufficient, and that a combination of two or more will be required. Here, however, we have the third problem. How can a contractor, for example, determine whether his work involves silicosis-dangerous dusts, or whether the kind and amount of dust is such as to expose workmen to the disease? No simple method of analysis is available. Before we can get far in the silicosis fight such methods must be developed.

A final problem is that of compensation laws. Four States now include silicosis in blanket industrial-disease clauses in their compensation acts. Two other States have special insurance funds to which employers may voluntarily subscribe for protection against silicosis suits. In several States legislatures are now considering silicosis compensation acts. Yet no single silicosis compensation act so far passed or proposed provides fair protection of labor and industry alike. Insurance executives warn that industry should avoid the delusion that the silicosis problem can be solved by insurance except at a very heavy cost. And most troublesome of all is the fact that silicosis develops so slowly -- often after many years, apparently -- as to make it almost impossible to determine responsibility with sureness.

This brief summary reveals the gravity and the magnitude of the situation. The problem is too big for any one individual or firm, even for a single group or industry. It demands the attention of a national organization. Perhaps the Bureau of Mines, if given adequate funds for thorough investigation, could show the way to a solution. The present uncoordinated activities of industrial hygienists, public-health authorities, labor, law-making bodies, and industries themselves are bringing no results. Coordinated and ably directed, however, they are certain to move foreward toward a solution of the problem.

Section 2.- Legal Aspects of the Dust-Disease Problem

Those interested do not agree that inclusion of dust diseases in compensation schemes for occupational diseases would solve the problem. McCann (395) believes that the movement to include pneumoconiosis in the workmen's compensation law should not be hastened, although ultimately this will be desirable; that it would be better to await the outcome of the common-law actions now pending as medical opinion and legal precedents may be established which will be favorable to the employer in regard to the contributory effects of dust upon nontuberculous respiratory infections; and that if a retreat to workmen's compensation is forced an effort should be made to adhere as closely as possible to injuries or diseases that can be defined specifically, although this may leave some opportunities open for common-law actions. However, such a course would be more advisable than an attempt at blanket coverage, the cost of which would be ruinous to industry. He also states that if the racketeers are successful in winning suits in cases of infectious injuries to lungs and upper air passages the result will be complete chaos in the insurance field; even if the cases are restricted to recovery for pneumoconiosis the tribute levied from industry will be "colossal", and whether paid through common-law action or through compensation it will be "a burden too heavy for some industries to stagger under." He feels sure that the cost of eliminating dust will be far less than the cost of insuring against the hazards of dust and suggests that specific provision be included to adjust compensation to degree of disability and thus eliminate most spurious claims.

Kellogg (410) states that the common law is not well-adapted to the determination of liability for silicosis; merely to put silicosis under the workmen's compensation act will not give the employee a quick and sure remedy at a reasonable cost, nor will such procedure bring within reasonable bounds the expenditures of the employer. In procedure under the common law three points must be established:

1. Has the plaintiff contracted silicosis. This is almost purely a medical question.

2. If the plaintiff has contracted silicosis, did he contract it because of conditions in the defendant's plant. This is partly a medical and partly a nonmedical question. Whether the conditions, having been once determined, were such that they probably caused silicosis is a medical question.

3. The remaining point to be proved by the plaintiff in a common-law action is whether the defendant was negligent in permitting the conditions which caused the injury to the plaintiff by silicosis. This question is a question of ordinary law and fact. It involves practically no medical questions.

As Kellogg (410) points out, the employee's remedy by common-law action is slow, difficult, and extremely expensive to both employee and employer; moreover a just and satisfactory outcome to either is uncertain. Although inclusion of silicosis in the workmen's compensation act would remove from consideration determination of questions of negligence, it would not remove the question as to where and in whose employ the workman inhaled the injurious dust; nor would it solve the medical questions of diagnosis and prognosis.

According to Tillson (411) "we in the United States have been too slow to realize the social and economic need for placing the dust hazards in industry under the jurisdiction of compensation laws, and it is to our shame that we have waited until forced by the economic pressure of 'racketeers' into a situation where we welcome such laws for our own self-protection." However, he thinks that the more hazardous trades will have to be very profitable to withstand the overhead involved in the heavy compensation expenses or the costs and awards of lawsuits resulting from an awakened public consciousness that the fruits of industry must not be enjoyed at the expense of the health and safety of the labor that produces them. In answer to the question, "Why advocate compensation laws in industry?" Tillson (411) states:

> Because when such laws are fairly, clearly, and intelligently drawn they give most necessary protection to both the worker and his employer from unscrupulous interests who prey upon both. The worker is seldom familiar with all of the hazards of his occupation unless they are specifically pointed out to him. He has a fear of the expense of time and money, and the uncertainty of results, from participation as a principal in lawsuits. His savings from wages

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can never compensate any incapacity and subsequent loss of earning power from industrial hazards, so he and his dependents are not provided for in case of such a misfortune contingent to industry; therefore he needs the protective interest of some well-informed and unbiased body politic.

The employer cannot be both a specialist in his own art and also qualify as a skilled pathologist and hygienist. He, too, needs guidance in the matter of vocational hazards as a result of expensive research beyond his means, and therefore dependent upon group activity or some public agency, in order that he may care for and protect his workers in a manner that any fair-minded employer desires. But without regulations and compensations prescribed by law he does not know what he should do and is left subject to disastrous monetary judgments in suits at common law from illinformed or misinformed judges and juries who cannot be expected to learn in a few days the technical intricacies to which technical experts have devoted years of study and which can be solved by them only after long periods of special experience. So without compensation laws the employer is subjected to the preying of "shyster" lawyers who exact from the worker a fee of usually one third to one half of the judgment granted to him and have even obtained as much as 80 percent of the amount allotted. Usually there is no limit to the amount which can be recovered, but a few States have enacted a statutory limit on recoveries for death. The judgment at common law is in a lump sum and is final after the defendant has failed in his appeal to the court of last resort; and such a judgment is not subsequently subject to revision even though newly discovered evidence proves that the condition of the plaintiff was exaggerated at the trial.

Under most compensation acts the payments are made in installments and even after the trial are subject to revision on the basis of additional evidence of the physical condition of the claimant, because the latter is still subservient to the powers of the compensation board. The employer, by the provision of liability insurance in accordance with compensation laws, can budget his vocational hazards and thereby avoid such uncertainties in his business, and he is taught the economic value of preventive measures and is justified in applying them.

Unscrupulous lawyers and doctors are deterred by compensation laws from preying upon both labor and capital.

Leland (412) points out that workmen's compensation legislation almost invariably has been a forerunner of general sickness insurance. In 1910 no State had such legislation. Today all but four have more or less elaborate systems of protection. There is no agitation for their repeal and little opposition to their continual extension. Extension, according to Leland (412), has already made "occupational disease" compensable in several States, and more are added annually. He quotes from a report of the Industrial Commission of South Dakota:

The original idea of workmen's compensation law was that of helping the injured worker to bridge over his troubles until he was again able to resume his ordinary labor. But by actions of legislatures, courts, and commissions it is beginning to approach that of a general plan of health and accident insurance.

However, the extension of compensation of industrial accidents to cover occupational diseases has proceeded slowly, although according to Ainsworth (413) there is no fundamental difference between them; both relate to prevention of injury to industrial workers -- the one from physical violence, the other through impairment of health. The two earliest laws (Switzerland, 1877, and Germany, 1883) covering employers' liability for industrial accidents provided also for the inclusion of occupational diseases (414). This seemingly logical interpretation of the scope of workmen's compensation laws to include industrial diseases within the meaning of the law was later discarded probably because of the difficulty of determining with accuracy the causal connection between diseases of gradual onset and slow development and the occupation of the victim. Disability to work is the only legal manifestation of occupational injury, and disability from disease often does not ensue for months or even years. By the time disability is established the diagnosis of its causes may be obscured, and the workman affected may have changed occupation or employer several times (414). The Committee on Standard Practices for Compensation in Occupational Disease of the American Public Health Association (414) gives the following reasons for the exclusion of occupational diseases from compensation:

> The state of medical knowledge has not yet reached a point where definite rules can be laid down for the differentiation of all diseases and their complications and sequelae which may arise from the conditions under which a man works, much less for the extent or duration of the disability which may fairly be claimed to follow upon them. Accidental industrial injuries have been to a certain extent clarified and classified, and standards for their diagnosis, treatment, amd consequent loss of working time have been built up from the experience attendant upon the passage of compensation laws, however, and it would seem as though the time had arrived when, in view of recent intensive scientific study which has been given to occupational disease, something of the same sort should be attempted at least for the industrial diseases now covered by the various laws. Such standards could not, of course, be included formally in any law, but would be exceedingly useful as a guide to both the medical profession and to laymen concerned in the adjustment of compensation cases.
>
> Fears concerning the wide open door through which the employer might seem to be held liable for all ill-health among his workmen regardless of its origin, on the claim that it had been "aggravated" by the nature of their work, are by no means groundless, and the business of deciding whether a man's occupation has lighted up, accelerated, or exacerbated a previously existing disease is a source of the greatest confusion and bewilderment in workmen's compensation courts. The

settlement of straight out-and-out occupational-disease claims has become a minor portion of the question. That other objections to the inclusion of occupational diseases in these laws have been overcome or proved more or less groundless will be seen in the following review of the laws. It will also be seen that under those laws which do not expressly state their intent on the subject the question of whether or not diseases are to be included and, if so, what diseases and when has often held a place in the foreground among the controversial aspects of the law.

Some of the State laws in the United States, for instance, still provide fertile ground for dispute over the construction that is to be placed on the words "injury" or "personal injury" where they are unqualified by the word "accidental" in the act. In a number of cases, this type of act has been interpreted, not without prolonged debate, to mean that diseases of occupational origin may be included. Generally speaking, when the words "accidental" or "by accident" are used in the act, it has been decided that those suffering from occupational diseases have no claim to compensation unless occupational disease has been specifically included in addition. Nevertheless, certain diseases which may occur with practically the same suddenness as an accident, such as gassings, have been impossible to exclude, and quite a varied collection of diseases has always been included if it could be shown they had resulted, even remotely, from an accidental injury.

This committee (414) roughly classifies most of the forms of workmen's compensation acts at present in effect as follows:

1. Laws which definitely include occupational diseases.

   A. Those having a schedule naming the diseases which are compensable.

   B. Those having a schedule naming diseases which are compensable only if they occur in workers engaged in certain listed industrial processes.

   C. Those having no schedule of diseases or processes.

2. Laws which do not specify coverage for occupational diseases but the wording of which is such as to allow legal interpretation to the effect that diseases arising out of and in the course of employment are compensable in the same manner as industrial accidents.

3. Laws which definitely exclude diseases except those which result from an accidental injury.

In scoring the "miserable lack of human concern" manifested on the part of the majority of States and those interests that sponsor legislative thinking in the compensation field Wilcox (415) states that the most cruel defect is the complete absence from every schedule list of those diseases of the lungs or respiratory tracts produced by that "most pronounced health hazard known to industry -- dust." He claims that the writers of the schedules knew all about silicosis and did not omit through oversight; that "they were willing that men should give their lives to sand-blasting, and to chipping, cutting, grinding, and polishing operations of the metal and granite industries; that they were willing to leave these men and their families to bear the most dreadful ending that may come to a laborer."

The report of the Planning Committee for Mineral Policy of the National Resources Board (416) calls attention to dust disease as the greatest health menace to the miner, whether in coal or in metal mines. It states that more underground workers probably are incapacitated or die from breathing excessive amounts of dust than are killed by mine explosions and fires and that while health is the greatest asset of any human being it is of greater relative value to the miner because his occupation demands the possession of far more than ordinary endurance and command of faculties. Yet silicosis is not included in the compensation acts of most of the States of the United States.

Sayer (417) places dust diseases in a class by themselves because they call for special treatment and rules in the consideration of claims; the subject is highly technical and presents many difficulties. He calls attention to the generally accepted fact that there are thousands of workers in inorganic dust whose lungs are affected to some extent by silicosis but that all of these cannot be put out of the industries in which they are employed and industry cannot possibly pay the huge sums in the aggregate that would be demanded if the law suddenly recognized that all these workers should be compensated in money -- not for what might develop but for the exposure already incurred over past years. To attempt to saddle such a load on industry would swamp it beyond the hope of recovery -- the economic effects would be most disastrous. With regard to a compensation law for silicosis he states:

> The only way industry can avoid this crushing burden is to see to it, insistently so, that the legislatures do not enact all-inclusive occupational-disease laws in broad general terms. The only safe and scientific way is to insist that where occupational diseases are to be included in the law it should be done in the definite scientific way by including all diseases known to be peculiar to the occupations in a schedule or list contained within the law itself. It is then a perfectly simple matter, as new processes develop new types of disease, and they can be medically and scientifically described and recognized, to include them as additions to the schedule, as has already been done in some States.

A model law for silicosis must contain many detail provisions other and different from the provisions for occupational diseases

> generally. It must make provision for recognizing the various stages of the disease, for periodic medical examinations, by X-ray and otherwise, to detect the earliest beginnings of the disease, and the steps to be taken when the presence of the disease is recognized. Also provisions must practically be made for a gradual assumption of the liabilities, so that the already accumulated cases are not at one time loaded on the industry, creating a burden impossible of assumption.
>
> Industry does not object to the inclusion of such conditions in the law in a practical way. It recognizes the obligation to compensate for silicosis and asbestosis. It will take the burden so far as it practically may, doing justice to the worker and preserving the industry upon which the worker is dependent.
>
> The foregoing facts will illustrate in a brief way the utter necessity for sane thinking and practical approach to this very complicated and difficult problem. If we would do only lip service to labor, we would say give us an all-inclusive occupational-disease law. If we would do a real and lasting benefit to labor, we will courageously meet a baffling situation with a practical remedy, we will make difficult the exploitation of labor by racketeers, and we will be enacting a schedule law for occupational diseases reach all real situations and at the same time permit industry to survive.

According to McLeod (418) the owner of an industry wherein the man-made dust hazard pneumoconiosis is evident has more and more to worry about every day, especially if his dust is a silica dust and his plant happens to be in a State where compensation laws do not recognize silicosis as a compensable occupational disease. On the one hand, the dust hazard menaces the health and future welfare of his workers; on the other, he unfortunately is open to damage suits at common law which jeopardize the existence of his industry; and, lastly, the insurance carrier, who heretofore has accepted the liability of coverage for such pneumoconiosis in good faith, now is misconstruing one or two clauses in his standard policy to dodge the liability. McLeod (418) also points out that the absence of regulations regarding dust hazards has led the industries to neglect dust control or dust prevention. At present the quarry owner is practically "on the spot" if his dust is silica, and the insurance carrier is attempting rather successfully to deny the liability on his part of the insurance contract. In answer to the question, "What can be done about it?" he states:

> The employee must be protected. The owner must be protected by his dust hazard being recognized as an occupational disease, compensable by the State compensation laws.
>
> Opinion must be solidified among all industries having a silicosis hazard, whereby pressure must be brought to bear to force enactment of proper legislation to place economic responsibility for this condition. * * *.

After years of experience as both a mine operator and a quarry operator the author cannot agree with the opinion that some dusts are harmless and even beneficial. Any dust, especially silica, once entered into the lungs is damaging, and the sooner the industry recognizes this fact instead of avoiding it like the proverbial politician's "hot poker", the sooner will the industry become straightened out as regards dust control, allowable dust count, recognition of silicosis by State compensation laws, rerating of the hazard and the standing of the carrier.

The operator, too, has a moral responsibility toward his employers and the rising standard of education in making the worker sit up and take more notice that he might become a silicotic.

Dust, like the poor, we will always have with us to some extent in the industry, and it is the duty of the operator to minimize it, just as it is the duty of the State to insist on its being minimized or eliminated.

There is a great field for research for the engineer to fight this hazard, and it will be eventually eliminated or cut to a minimum. But, in the meantime, the owner must be protected from the carrier.

Lazenby (419) warns the employer not to underestimate the danger to which he is exposed in the present trend toward the liberalization of existing workmen's compensation laws to include occupational disease. Already the existence of several industrial concerns is threatened by litigation arising from silicosis. The money involved runs into millions of dollars, and the surface has not been scratched. In addition to the possibility of legitimate claims the rackets have already invaded the occupational-disease field, and unscrupulous lawyers aided by unscrupulous or uninformed doctors are fabricating claims on a wholesale basis. The employer will be forced to pay this bill as well as bills for many diseases not heretofore recognized as having industrial origin but which later, as interest and research develop, may prove to be so associated in their inception. The employer must either be willing to pay this cost, or he must make an effort to prevent it. According to Lazenby (419) one of the chief obstacles that the safety engineer of the casualty company meets in the industrial plant is the resistance of the management to changes in methods or safeguards to prevent accidents. If this resistance is as stubborn in the field of occupational-disease prevention as it has proved to be in accident prevention the employer will find his costs for insurance prohibitive, or he may even find himself uninsurable. The employer is advised to familiarize himself with any legislation proposed for inclusion in the workmen's compensation act provisions embracing occupational disease. Such laws, unless rigidly drawn, can open avenues that will impose a tremendous and unjustified drain upon industry as now conducted. Admitting the justice of the philosophy that human wear and tear is as proper a charge against industry as the wear and tear of machines, Lazenby (419) states that the administration of some of our workmen's compensation acts has been so broad and liberal that industry has been taxed far beyond the spirit of the law and the requirements of social justice. He warns that occupational-disease legislation, unless carefully drawn, is even more susceptible to broad interpretation than workmen's compensation laws. It can be adapted easily to embrace in effect compulsory health insurance, old-age pensions, and unemployment insurance for workers. There are many advocates of the theory that occupation can be considered the basis for almost any disease to which mankind is heir, and there are many theorists who believe that capital should bear all the burdens of labor and are eager for the opportunity which occupational disease seems to offer to put their theories into practice.

The following quotation from an article by Tillson (420) gives the viewpoint of some of the workers and indicates the rising interest of the laborer in an intelligent consideration of his working conditions; whether or not his viewpoint is correct it must be accepted by industry for correction of conditions or misunderstandings:

> The mine officials here have long been aware of the dangers of dust but have never made more than a half-hearted effort to abate the hazard. The more intelligent miners have always wet down their places and advised their fellows to do the same, but there never has been a systematic campaign to educate the miners about the dust hazard. This is one of the things our union hopes to bring about in connection with our effort to get silicosis legislation.
>
> We have already realized that it will be difficult for us to obtain far-reaching social legislation with the present political set-up of this State * * *. The last legislature was largely controlled by the mining and utility companies, and so we are laying the groundwork of a movement by which we hope to unite the workers and farmers behind a common program beneficial to both classes * * *. There are several hundred old-time miners who are still able to do a day's work and make a living. It is possible, if they are covered by the law and the law should pass, that they would immediately be X-rayed and cut off the pay roll. Then we have the same situation referred to in your second article -- miners who have worked in every mining company in the West. We could not expect the local companies to compensate these men for a disease contracted under other employers.
>
> Of course it has already become apparent to me that silicosis legislation is a problem too difficult and complex for ordinary miners to cope with by themselves, but we are convinced that a start must be made some time. If nothing else, we will drag the subject of dust disease out into the open and give it the publicity it deserves. I believe that there has been a studied effort here in _____ to minimize the importance of silicosis. If a miner dies from tuberculosis complicated with silicosis the disease is never mentioned in the press. They call it a "long illness."

> We visited the _____ tuberculosis sanitarium about 2 weeks ago and got some interesting figures. For the 5-year period 1929-33 there were 179 men admitted from _____ County, and, of these, 151 miners, 80 percent of the population of the county, are concentrated in this mining camp. The adult population is about 20,000, but during the period mentioned the actual underground workers did not exceed 4,000. During 1932-33, 27 men from this county died at the sanatarium from tuberculosis, and 23 of these were local miners. Nearly every miner's case was combined with silicosis. * * *.

In considering methods of defense against silicosis suits most authors emphasize the importance of preventive measures. According to Sappington (421) progressive industries will avail themselves of preventive methods and will discover the difference not only in economic cost but also in lessened absenteeism, labor turn-over, inefficiency, spoilage, and other factors so intangibly represented by a dollars-and-cents point of view. Furthermore, the relative value of knowing qualitatively and quantitatively the degree of health hazard in any given industrial environment is greatly enhanced by having such information before differences of opinion arise as to what constitutes a hazard.

The following statement by Farrell (422) indicates the defensive value of preventive measures:

> It is entirely possible to work out a defense to silicosis cases for claims arising in the future if all the statutory requirements are complied with in the various plants and if it can be shown that the employer has done everything possible to safeguard his employees.
>
> All the law requires is that the employer exercise ordinary care and caution.
>
> This, of course, implies that the employer must comply with statutory requirements with reference to his plant and property; and where there is a violation of any statute regulating the operation of any plant or factory, such proof on the part of the plaintiff is sufficient to take the case to the jury, and all that is necessary is to prove the disability with medical evidence.
>
> Even though an employer complies fully with a statute, it is sometimes shown in these cases that the contrivances used in such compliance are defective or are not used continually. This, of course, makes out a case of negligence.

The following opinion filed on the appeal of the Pennsylvania Pulverizing Co. (423) from the decision of a lower court in a lawsuit in which an employee claimed to have contracted silicosis illustrates the value to the employer of taking measures to protect his employees from occupational-disease hazards:

In the United States Circuit Court of Appeals for the Third Circuit (No. 4861; Term 1932)--Pennsylvania Pulverizing Co., Codefendant-Appellant, vs. Eldred C. Butler, Plaintiff-Appelee

Appeal from the District Court of the United States for the District of New Jersey. Opinion filed September 29, 1932, before Buffington, Wooley, and Thompson, Circuit Judges. Wooley, Circuit Judge.

Pennsylvania Pulverizing Co. is engaged in the business of grading and pulverizing sand for commercial purposes. The process, shortly stated, is to dig from a pit free silica sand such as is found on beaches by the sea. A portion of this raw produce is sold for building purposes and for use by railroad locomotives and foundries. For practically all other purposes the sand must be converted into its relatively pure crystalline form; therefore the balance is washed over concentrating tables to eliminate fine particles and impurities. The residue, now pure silica but with quartz particles of different sizes, is, after drying, hoisted in conveyor buckets to the top of an 80-foot tower and dropped on a vibrating screen of a certain mesh. Sand grains which are too large to go through the screen are carried off as tailings; the sand which goes through the first screen but does not go through screens of progressively finer mesh positioned below is sold mainly for the manufacture of glass. That which is not so disposed of is put through airtight revolving pebble mills and ground to a powder which, after sale, usually is used for the abrading element in many commercial products, among them tooth paste. Although much of the sand movement is in airtight passages, the operations as a whole are very dusty.

Eldred C. Butler had for nearly 2 years been an employee of the Pulverizing Co. He claimed that, while in its service, he contracted a disease, or perhaps because of uncertainty of the medical profession the ailment may be called a condition, known as silicosis. However termed, it is serious. It arises from exposure to silica dust and is incurable. The symptoms are shortness of breath, limitation of lung and chest expansion, loss of weight, and a dry cough. When silica dust is inhaled, the particles under 10 microns in diameter (a micron is 1/25,000 inch) enter the tiny lung sacs and stay there, setting up an overproduction of fibrosis or scar tissue. These small dust particles do the mischief; the larger or ordinary dust particles are discharged by the respiratory organs.

Stating the duties which in law a master owes his servant and averring that by breach thereof he had, on inhaling uncontrolled silica dust, sustained serious injuries, Butler brought this suit. He specified, very satisfactorily from a pleader's standpoint, four grounds of negligence which we shall state and discuss presently. From a judgment in his favor, the defendant took this appeal.

We must, preliminarily, dissipate the atmosphere which beclouds the real issue of the case in order to bring them sharply into view. The plaintiff, at the argument, laid great stress upon the dusty character of the industry in which the defendant is engaged, indicating that it is highly dangerous in that it involves serious and somewhat insidious hazards to health, and implying, without asserting, that the industry is unlawful. Assuming for present purposes that the industry is a dangerous one, yet, even so, there is no evidence that it is unlawful. Like many industries whose products are pulverized materials, such as cement, lime, gypsum, feldspar, barytes, talcum, snuff, and medicinal and dental bases which affect the health or comfort of their operatives, the product of the industry in which the defendant is engaged is impalpable powder -- indeed, its product is dust, the manufacture of which is not per se unlawful and the operations are not per se negligent. Therefore, whether this is an industry which, on public or humane grounds, should be abolished is a matter not to be determined by the judicial department of the government and is not here in issue.

There are many questions raised on this appeal. The main and perhaps controlling one is whether the trial court erred in refusing the defendant's motion for a directed verdict for one or more of the reasons there alleged. The first reason was that there is no proof of any one of the four grounds of negligence on the part of the defendant which the plaintiff alleged in his complaint and on which he built his case.

The first ground of negligence charged, and assailed as not provéd, is (a) that the defendant failed "to use reasonable care to provide the plaintiff with a reasonably safe place to work."

The duty of a master in that regard is, as matter of law, so well established that it does not call for discussion. (Burhs v. Del. & Atl. Tele. Co., 70 N.J.L. 745.) This averment, however, is general and may be passed by in view of the particular averment to the same effect and to which all evidence on the point was directed, that (c) the defendant, in making the place safe for the plaintiff to work, failed "to use reasonable care to provide a proper ventilating system in its plants."

The Pulverizing Co. had been in the business of pulverizing sand since 1906. In 1929 it built a new plant at Toms River, N.J. Before completing construction, its president, who had long been conversant with the industry and its objectionable operative features, took certain measures bearing on a master's duty to protect his servants by exercise of reasonable care, to which he testified as follows:

"When we were drawing the plans for this plant * * * at Toms River, both myself and several of our engineers visited a great many dusty plants all over the eastern part of the United States. By that I mean east of the Mississippi River. I went as far as St. Louis to see one.

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I inspected plants in Cleveland and Rochester, in Keene, N.H., down at Erwin and Sweet Water, Tenn., all plants I could find where they were handling dusty material, in order to benefit by all of their experience in securing the very best dust-collecting and ventilating system that was possible to get for that plant at Toms River. They submitted plans for that dust-collecting and ventilating system. We adopted those plans and instructed them to go ahead. Those plans were submitted to the Department of Labor at Trenton, Department of Labor of the State of New Jersey, and that ventilating and dust-collecting system covered the entire plant where there was any dust at all. It did not apply to parts of the plant where there was no dust.

"We selected the Northern Blower Co. because we found they had done a great deal of the work outfitting other plants in the other dusty trades, not only the silica business but in a great many others, lime and gypsum, feldspar, etc. We found they had a great deal of experience, and we believed their system was the best system we could obtain for that purpose.

"We installed that completely; the cost of it was pretty heavy, but we installed it as planned, at the start, before the mill was finished. That was fully installed with the working of the mill."

Professor Drinker, associate professor of hygiene at Harvard University, School of Public Health, testifying with reference to the defendant's ventilating system, said, in answer to a question whether or not it was standard in that type of plant: "There is not any real standard. It is fully in keeping with, if not better, than the standards in other plants that I saw or in grinding plants in general."

M. E. Eiben, president of the Northern Blower Co., Cleveland, Ohio, which designed and installed dust-collecting systems all over this country and in foreign countries; indeed, he had made dust collecting his life's work and had done nothing else. He further testified that the dust-collecting machine in use at Toms River is of the type approved by the State of New York and is accompanied by certain guarantees as to clean discharge of air. When asked whether or not the equipment which his concern had installed compares in efficiency with dust-arresting and dust-collecting devices in other silica plants, he answered that it does. To the question: "Andis it abreast of the art?" He replied: "It is up to the minute."

Ellwood Driver, inspector of the New Jersey Labor Department, testified that in December 1930, he visited the plant twice and found it "in excellent condition" and on examining the ventilating apparatus, he found it "fine * * * good, very good."

Dr. Andrew F. McBride, former Commissioner of Labor of the State of New Jersey, visited the plant in May 1931. Though after the event, his testimony was admitted on a promise by the counsel to connect it up. It was to the effect that, as to the condition of the plant with respect to safety appliances and precautions taken for health of the workers, he "found it to be in a very good condition."

John Roach, Deputy Commissioner of Labor of the State of New Jersey, examined the plant in December 1930 and January 1931. In reply to a question with reference to safety appliances, both ventilators and respirators, he said: "I found it satisfactory."

Morton I. Dorfan, manager of the dust-collecting division of the Pangborn Corporation, a member of the National Safety Council on the Sand-blast Hazard Committee of that organization, visited the plant in May 1931. On being asked to tell the court and jury the condition and efficiency of the ventilating system which he found there in operation, he answered, without objection: "I would consider that ventilating system, even though it has been built by a competitor of ours, as equal and possibly superior to many I have seen in plants, handling, first of all, the same kind of dust, and other siliceous dusts."

Dr. Henry H. Kessler, director of the State Occupational Disease Clinic of New Jersey, speaking with reference to the equipment for ventilation at the Toms River plant, said: "From my general knowledge of plants having dust hazards, I believe the equipment used was satisfactory for the purpose."

Opposed to this testimony for the defendant on the issue of negligence in ventilation, the plaintiff proceeded to prove negligence in this particular by testimony that his work about the plant was in sweeping up the dust, in bagging sand, sometimes directly from the end of the mill, in burlap, or tightly woven cloth bags which sometimes would burst, in working at the drier, but mainly (for about a year) in working in the screen tower keeping the vibrating screen from clogging by means of a compressed-air gun and a steel brush. Butler testified that to the screen at the top of the tower there ascended through an open shaft a belt conveyor with uncovered buckets of sand, and that, though from buckets and screen the dust was very bad, there was no ventilating system except windows which he was ordered "to keep shut, to keep the sand from blowing off from the belt, going to the screen." And, finally, that Driver and Roach, officials of the New Jersey Labor Department, recommended the use of paper bags in place of fabric bags.

On this evidence the court submitted the case and allowed the jury to find whether the defendant was negligent, because of lack of reasonable care in failing to install and maintain a proper ventilating system in its plant.

Whether on this evidence the court erred in submitting the case to the jury is a question to be determined not by weighing the evidence for the plaintiff against the evidence for the defendant, since that is not the function of an appelate court, but by subjecting the evidence for the plaintiff alone to the test of several well-established rules of law relating to the quality of proof in general and to the character of proof required in this particular kind of negligence case. The first, which is negative, is that in Federal courts the scintilla rule no longer exists; the second, that evidence to be controlling should be substantial enough, if submitted, to sustain an affirmative finding by the jury (Evans v. Ely, 13 Fed. (2d) 62,64); and to be validly submitted it must be "something of substance and relevant consequence, and not vague, uncertain, or irrelevant matter not carrying the quality of proof." (Minahan v. Grand Trunk Railway Co., 138 Fed. 37.)

The plaintiff's evidence of the defendant's ventilating system might show negligence were it permissible to infer negligence from the fact of the plaintiff's injury, or it might show a spark of evidence of negligence from the fact that the windows in the tower were kept closed. But without more to prove that keeping the windows closed need not, in an orderly manufacturing process, have been done or should not, for the plaintiff's protection, have been done, that evidence, standing alone, is not enough to submit to the jury, or, if submitted, is not enough to sustain an affirmative finding of negligence. It left uncertain and unproved, and therefore left the jury of conjecture, whether the defendant did something it should not have done or failed to do something it should have done. Keeping in mind that the plaintiff charges the defendant with negligence, not in making too much dust or in making more dust than a properly organized plant properly operates would make, but in failing to use reasonable care to provide a proper ventilating system to control the dust it did make, proof of much dust at a particular place without proof that the defendant could and therefore should have provided efficient means to overcome it is not substantial enough to be controlling on the averment that it was negligent in failing "to use reasonable care to provide a proper ventilating system."

Moreover, the plaintiff's evidence of negligence in ventilation must respond to the test of another rule affecting a master's duty to his servant, which is that he is required only to use "reasonable care" in selecting instrumentalities for his protection. On this rule, now established almost everywhere, this court said in Haines v. Spencer (167 Fed. 266,271):

"The employer is not an insurer, and the duty imposed upon him is not to furnish the safest or newest and best machines and appliances, but only to exercise due care to provide those which are reasonably free from danger. (Citations.) And the rule as to this is the usage of the business, negligence not being imputable where the machine in question is that which is generally employed." (Citation.) (Tompkins v. Machine Co., 70 N.J.L. 330; Stapleton v. Reading Co., 27 Fed. (2d) 242.)

The court, continuing on the question as to how this is to be proved, said:

"It may be that, for the purpose of comparison, it would be admissible, in order to aid the jury in determining what is reasonably safe, to put other machines in evidence which are in common and ordinary use in similar establishments." (Citing authorities for and against this procedure.)

Without expressing ourselves upon the procedural part of the rule, it should be noted that, whatever it be, the plaintiff in this case, though recognizing the rule of "reasonable care", assailed the defendant's system of ventilation (as involving negligence) by proof of dust in large quantities here and there, not by proof of other mechanism or means known to the industry or to the science of hygiene by which the dust could be controlled more effectively. So the plaintiff's evidence not only failed to prove (by showing better instrumentalities) that the defendant's ventilating system might have been better but, for the same reason, it stopped short of proving it was not such a system as by the exercise of reasonable care could, and should, have been furnished. Failing affirmatively to meet this test and failing also to contradict the defendant's evidence as to its exercise of reasonable care in studying the dust problem, endeavoring to solve it, and providing not only "apparatus in common use" but "apparatus of superior quality", purchased from a reputable and experienced manufacturer (Bauman v. Condin, 75 N.J.L. 193, 195; 76 N.J.L. 575), the plaintiff's evidence was insubstantial within the rule of Evans vs. Ely, Supra, and offended the final rule (and test) which forbids the submission of such uncertain evidence from which the jury was permitted to guess and decide, against the practice of the industry and knowledge of the art, what is a proper or improper ventilating system in the industry. (Del. L. & W.R.R. Co. vs. Koske, 270 U.S.7; Kilpatrick vs. Choctaw O. & G.R. Co., 121 Fed. 11; Canadian Northern Railway Co. vs Walker, 172 Fed. 346; B. & O.R.R. Co. vs. Newell, 196 Fed. 866; Lehigh Valley R.R. Co. vs. Passinier, 4 Fed. (2d) 46.)

Another reason in the defendant's motion for a directed verdict (still under consideration) is that the plaintiff did not prove its second averment of negligence in that the defendant (b) failed "to use reasonable care to provide the plaintiff with proper masks or other appliances or safeguards in said work."

The president of the defendant company testified that before starting up the Toms River plant he gave a great deal of study to masks and particularly to the types made by the Willson Co. He visited concerns that purchased these masks, saw them in use in dusty plants, and then adopted them.

Dr. Andrew F. McBride, Commissioner of Labor of the State of New Jersey, testified that the masks with which the defendant supplied its servants "were practical and efficient."

John Roach, Deputy Commissioner of Labor of the State of New Jersey, testified that masks of the type in the defendant's plant had been approved by his department of labor for use in this type of work.

Harry F. Speer, president of the New Jersey Pulverizing Co., a competitor of the defendant, testified, as did one of the witnesses for the plaintiff, that "air-line masks", another type, were still in an experimental stage. He said that the masks used by the defendant were in his judgment, after 30 years' experience in the business, better suited for the purpose.

Dr. Fred Willson, president of the Willson Products Co., Reading, Pa., a member of the Sand-blast Committee of the National Safety Council and of the Advisory Committee of the Bureau of Standards, said with respect to the defendant's masks, that they are used generally in dusty trades and are "for all practical shop purposes fully protective." Speaking with reference to the air-line or direct-pressure masks, he testified: "To the best of my knowledge it had not been used and I would not have recommended it."

Professor Drinker, of the School of Public Health, Harvard University, said that the Willson sponge mask used by the defendant is "a little ahead of the standard" and the air-line mask, which is still in an experimental stage, is "just an unsatisfactory piece of equipment for that work * * * is distinctly impractical * * * they have not been successful."

The testimony for the plaintiff on the question of masks shows that, entering the defendant's employ in June 1929 and leaving it in February 1931 he was not given a mask for 3 months after his employment. He was then given masks which were in common use throughout the plant and wore them the remainder of his stay, but contends they were defective because dust particles seeped through the sides and through the sponge and because the mask can only operate properly with a moist sponge and the sponge could not be kept wet by workmen at the top of the screen tower as the nearest available water was kept at the bottom of the tower. Other witnesses for the plaintiff testified to the same effect, although none contradicted the testimony for the defendant as to its care and caution in selecting and providing masks. The drift of the plaintiff's testimony was that the defendant should have furnished a better mask, perhaps the air-line mask, although the testimony for both plaintiff and defendant was that such a mask, being still in the experimental stage, had not gone into general use in the industry.

Notwithstanding there is testimony for the defendant that masks were supplied all men at the opening of the Toms River plant and continuously thereafter, we shall accept as true the plaintiff's statement that he was not supplied with one until 3 months after starting work. But we shall regard this statement, in view of the plaintiff's failure even to intimate that disease developed during that period, as not bearing on the question because, according to the evidence, the disease of silicosis occurs only after exposure to silica for a long time, and, that assuming it later developed, it could not have been set up in the first 3 months of the 20 months of the plaintiff's employment without being discovered by him before the sixteenth month.

In August 1930, 14 months after going to work, the plaintiff complained that his mask did not fit and was furnished another. He testified that in October 1930, 16 months after going to work, he felt pains in his chest and in November felt pretty bad. Several weeks before the end of his employment he requested that he be furnished with an air-line mask in place of the sponge mask which he had been using. The superintendent promised to get him one. Such a mask was obtained and given to the plaintiff but, because its valve clogged repeatedly, requiring the man to take off the mask and make adjustments in the dust, it was not satisfactory and could not be adapted to the defendant's plant.

The evidence for the plaintiff as to the defendant's alleged negligence in supplying the kind of masks it did and in not supplying better ones shows the same infirmities as the plaintiff's evidence of negligence in the ventilating system previously discussed. It is controlled by the same rules of law, is subject to substantially the same observations we there made and is, we hold, equally unsubstantial. It follows it was error for the trial court to submit this evidence and permit the jury to find from it that the defendant was negligent when it does not show how better, or how else, it could perform its duty of exercising reasonable care in the circumstances.

The fourth and final ground of negligence which the plaintiff charged to the defendant was (d) its failure "to give the plaintiff proper warning, information, and knowledge of the dangerous character of its work with the sand-silica dust."

There is, of course, no question of a master's duty in this regard. He must instruct and warn his servant as to dangers of which he knows or ought to know, and of which he knows or ought to know the servant is, from the nature of things, ignorant. (Ramsay v. Raritan Copper Works, 78 N.J.L. 474; Rhobobsky v. N.J. Worsted Spinning Co., 76 N.J.L. 542.)

It is not clear that the defendant knew precisely what the effect of long exposure to silica dust would be, nor is it at all certain that it is chargeable with pathological knowledge of the subject in view of the uncertainty with respect to the matter prevailing in the medical profession.

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One doctor testified: "There is no knowledge anywhere in the country today of how much exposure is necessary to produce silicosis. Nor is there any accepted standard by which one can tell whether a given set of conditions will or will not produce silicosis."

Another doctor testified: "There is no expert on silicosis because it is a state of disease that nobody, even those who claim to have experience in the matter, is able at the present time to determine what silicosis is, except they know it is fibrosis of the lung. Beyond fibrosis of the lung they do not know what it is."

At the trial the medical experts were divided into two groups on the question whether the plaintiff has silicosis at all.

Yet, unquestionably, the defendant master should have known that there is some danger from constant exposure to dust from ground quartz. Evidently, it did know it, and it realized its duty to guard against that danger by providing ventilators and respirators and then by warning its servants. The defendant, speaking through its president, said:

"We always told every man who worked in the mill the danger of the dust. We have always given without expense to them the most effective mask we could find for that purpose. We have told them they must wear these masks at all times there in the mill on duty. We have shown them how to wear masks, how to adjust them, how to clean the sponges. We have provided facilities for cleaning the sponges and we have seen that they do wear the masks * * *. The supply of these masks was kept in an accessible place, and the employee was permitted to help himself to them."

The foreman of the plant testified that the men uniformly were told that dust was injurious to health and they should wear masks and try to prevent it.

Opposed to this the plaintiff testified that he was not so warned. Yet the fact is, he was supplied with masks and wore them, and the fact remains, not disputed, that the defendant supplied masks generally and instructed the men in their use. The defendant's act of supplying the plaintiff with masks and the plaintiff's observation that it supplied his fellow workers with them are warnings in themselves for, obviously, a master would not have required his servants to undergo the inconvenience of wearing masks and, indeed, the servants would have refused to wear them, unless there were some reason for their use. We think the real trouble on this issue of warning is that the plaintiff complains that the defendant did not warn him of the pathological effect of inhaling silica dust. This may be true but it is not certain that the defendant knew or should have known it in time reasonably to warn the plaintiff. We find no evidence on the part of the plaintiff charging the defendant with knowledge of the disease. Nor is there evidence that the disease normally follows contact with silica dust, or what conditions will produce the disease, or how long it takes to develop, or, when defeloped, what precisely is its character. We find it difficult to believe that an employee of normal intelligence working in dust has to be told that inhaling dust of any kind in large quantities is injurious for, obviously, when he is handed a mask and put to work with other men wearing masks in a place equipped with artificial ventilators, that is a plain enough warning that dust is deleterious. We cannot find, on the plaintiff's showing, substantial evidence that the defendant failed in its duty to give the plaintiff adequate warning of the dangerous character of his occupation.

We are constrained to hold that the learned trial court erred in submitting the case to the jury and in refusing to direct a verdict for the defendant on the ground that the plaintiff had failed to prove by substantial evidence any one of the four allegations of negligence on which he rested his case.

As the decision on this question is dispositive of the case, we shall, without reviewing the other questions, decree that the judgment below be reversed, a venire de novo issue, and that any further proceedings shall be conformable with this opinion.

A true copy: Teste: Clerk of the United States Circuit Court of Appeals for the Third Circuit.

As an example of preventive regulations applicable in dusty industries, the following provisions on dust are quoted from the Standards for Safety and Health for the Crushed Stone, Sand and Gravel, and Slag Industries, approved by the National Industrial Recovery Board on December 7, 1934 (424):

Appendix B, Article I--Definition of Dust Hazard

A dust hazard shall be deemed to exist in any plant where the air breathed by an employee at any point in the normal breathing zone contains particles of dust composed of free silica when the dust count thereof shall exceed 5 million dust particles of a size less than 10 microns per cubic foot of air, as determined by the U.S. Public Health Service Technique, described in Reprint No. 1528 from the Public Health Reports, vol. 47, no. 12, March 18, 1932, entitled "The Impinger Dust-Sampling Apparatus." Variations in the percentage of free silica content will make proportional changes in this standard.

Article II - Exhaust Ventilation

Exhaust ventilation shall be provided, wherever practicable, in connection with all equipment and processes which create a dust hazard in the normal breathing zone of employees. Such exhaust ventilation shall comply with the requirements of "Rules Relating to the Removal

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of Dust, Gases, and Fumes" adopted by the Department of Labor of the State of New York, effective January 1, 1934, as provided by Bulletin No. 12 of the Industrial Code of the State of New York.

Article III - Protective Equipment

Whenever and wherever a dust hazard shall exist in an industrial operation, the employer shall supply the employees with respirators sufficiently effective to render the air breathed by said employees nonhazardous, as hereinabove defined. Face respirators shall be of the type certified and approved by the U.S. Bureau of Mines, Schedule No. 21.

The use of protective equipment, as provided by this article, does not relieve the employer of the obligation imposed by Article II to install exhaust ventilation.

Article IV - Packaging of Ground Sand

For packaging ground sand the use of cloth bags is prohibited.

Article V - Physical Examination of Employees

1. Subsequent to the effective date of these Standards of Safety no person shall be employed where there is a dust hazard, as defined in these Standards of Safety, unless his physical fitness to engage in the duties for which he is to be employed has been determined by a physical examination, which examination shall include an X-ray of the chest.

2. Employers shall cause all employees exposed to a dust hazard, except those employed prior to the effective date of these Standards of Safety, to be subjected to an annual physical examination, which examination shall include an X-ray of their chest to determine their physical fitness to continue in the duties for which they are employed.

3. Employers shall not permit employees suffering from active tuberculosis to engage in duties where a dust hazard exists.

Article VI - Notice and Warning

Employers shall post and display in a conspicuous place in each plant a notice, advising employees:

1. That the inhalation of silica dust is injurious to health;

2. That the use of protective equipment is necessary when exposed to a dust hazard; and

3. That the failure of employees to use such protective equipment shall render such employees subject to discharge.

Article VII - Good Housekeeping

1. Respirators.- Employers shall cause respirators to be inspected daily and maintained in the highest state of efficiency and shall provide a dusttight receptacle in which such respirators, marked with the user's name, shall be kept when not in use.

2. Plant cleaning.- Working areas whereon dust is deposited in harmful quantities shall be cleaned at regular intervals.

3. Maintenance of equipment.- Exhaust and collection systems and all protective equipment shall be inspected at regular intervals and shall be maintained in effective working condition.

4. Designation of inspector.- Each employer shall designate a competent, responsible person, specifically charged with the duty of inspecting and repairing exhaust systems, respirators, machinery, and equipment. Such person shall instruct employees in the use of protective equipment, supervise the use thereof, and be responsible for the enforcement of the provisions for good housekeeping.

Advisory Recommendations for the Protection of Employees from the Hazards of Dust for the Crushed-Stone, Sand and Gravel, and Slag Industries

Article I - Dust Counts

The use of dust counts is recommended for the purpose of obtaining information as to the existence of dust hazards and, if taken periodically, will determine the effectiveness of dust-eliminating equipment. With respect to the method of taking dust counts, the following suggestions are made:

1. Wherever practicable, dust counts should be taken by the impinger method, as described in Reprint No. 1528 from the Public Health Reports, vol. 47, no. 12, March 18, 1932, published by the United States Public Health Service.

2. Standard equipment and competent personnel should be used, and the results should be interpreted in the light of the variable factors involved.

3. In those cases where it is impracticable to use the Impinger method of sampling dust the count should be taken by other approved methods and calibrated to the impinger method.

Article II - Exhaust Ventilation

Prior to the installation of exhaust ventilation, it is recommended that dust existing in the plant be eliminated, as far as is practicable, by one or a combination of the following methods:

1. Isolation or segregation of the dust-producing operations in separate departments or buildings.

2. Completely enclosing or housing the dust-producing operations within a department.

3. The substitution of nondusty processes for dustyprocesses.

4. The installation and perfection of natural-draft ventilation.

All exhaust ventilation systems should be so located with respect to the plant:

1. That the discharge therefrom will prevent dust in harmful quantities from entering the normal breathing zone of workers in and about the plant; and

2. That injury to property is averted and no nuisance is created.

Article III - Protective Equipment

In order to make the use of protective equipment most effective, employers should instruct employees to follow the recommendations and suggestions of the manufacturers of such protective equipment as to the use thereof.

Article IV - Packaging of Unground Sand

For packaging unground sand, the use of paper bags is recommended. Where cloth bags are used, such bags should be lined or walled with paper. In the event that unground sand is sold in cloth bags, the return of such cloth bags to the producer should be prohibited, so that employees will not be subject to the dust hazard of handling and cleaning such bags.

Article V - Physical Examination of Employees

The physical examination of employees should include:

1. Examination of employees, including fluoroscopic examination, by competent physicians, expert in the diagnosis of pulmonary diseases.

2. The obtention of a complete industrial and medical history of employees, together with the tubercular history of the employee's family.

3. It is desirable that X-ray examination of the chest should be made by steroscopic films; in the event that flat films of the chest are taken and such films indicate any lung pathology, they should be supplemented by stereoscopic films.

Article VI - Good Housekeeping

Orderliness and cleanliness are important factors in dust prevention. When properly supervised and practiced, good housekeeping will prove to be one of the most effective methods of eliminating the dust hazard. Due to the different problems that arise in different plants, no set rules can be established as to the methods to be used for cleaning. However, the following suggestions are made for use wherever possible:

1. Cleaning by air pressure should not be permitted except where absolutely necessary.

2. Floors and walkways should be cleaned daily.

3. Walls, overhead structures, and equipment should be cleaned by means of a vacuum system.

4. Sweeping should be done wet and at the end of the shift.

5. During the cleaning operation, protective equipment should be worn by those engaged in the cleaning process.

The following court decision (422) indicates conditions presented to employers and insurers in the courts in connection with silicosis damage suits:

> There have been a number of interesting decisions on silicosis claims within the last year or two, such as Defilippo's case, 188 N. E. 245, which was decided in the Supreme Judicial Court of Massachusetts on December 6, 1933.
>
> There were two insurers; the Standard Accident Insurance Co. ceased to be the insurer on January 10, 1932, and The Service Mutual Liability Insurance Co. became the insurer on January 15, 1932. The board found that the employee became totally incapacitated for work on February 11, 1932, and that "the accumulation of dust in the employee's lungs absorbed during the period from January 15, 1932, to February 11, 1932, was sufficient to cause and did cause the final break-down on the latter date." The court held "that an insurer under the workmen's compensation act must take an employee as he may happen to be during the term of the policy. It is immaterial that the employee is unusually susceptible to personal injury, or to serious consequences in the

event of personal injury, or that personal injury is impending because of the cumulative effect of years of exposure to the hazards of the trade. Here the employee was found to be incapacitated for work on February 11, 1932. The amount of dust inhaled during the 4 weeks immediately preceding was, in the opinion of experts, sufficient to be 'detrimental', and a 'perfectly possible cause of his incapacity.' Since the condition from which he was suffering was cumulative, the dust inhaled during the last period of labor before incapacity became manifest was most likely to be decisive. The finding of the board that it was the last straw which broke down the employee's capacity for work, cannot be pronounced as being unsupported by evidence."

In this case it is to be noted that the insurance carrier during the last 4 weeks of the man's employment was held responsible for the disability which became evident during the last 4 weeks, even though the man had worked for a long period prior to that.

By the same logic used by the court in rendering the decision in this case, the same rule would undoubtedly be laid down if the employee had two different employers.

If such were the case, and the second employment started on January 10, 1932, the second employer would be liable for the employee's disability even though the employment only existed for about 4 weeks, because as the court said in its decision, "it was the last straw which broke down the employee's capacity for work."

The decisions of the Supreme Court of Massachusetts are looked up to by courts in most States, and for that reason this decision is very important in the silicosis situation, because it will undoubtedly be followed.

In Massachusetts silicosis is under the workmen's compensation act, but so far as the common law is concerned, in common-law cases this decision will be followed with reference to the determination of the happening of the accident -- which the decision determines to be during the last period of work, or the period in which the employee became incapacitated.

It is quite evident, therefore, that it will be highly important in the future for employers, whether a silicosis action is under the workmen's compensation act or not, to have proper and sufficient clinical and X-ray examinations of prospective employees before they are put to work.

Otherwise, employers will hire employees who have been engaged in the same line of employment, many of whom will be potential silicosis claimants in view of their preexisting condition. The medical authorities will agree that the sickness resulting from silicosis does not always make itself evident at the time; its contraction might become manifest at any time.

With regard to the statement above that the last employer may be liable for the employee's disability it is interesting to note that the Pennsylvania Commission on Compensation for Occupational Diseases (425) suggested that "the employer in whose employ the claimant was at the time of the disability shall be the one who shall pay the compensation provided that his employment was the one wherein the claimant's disease was contracted or aggravated with the possible addition of a provision by which such employer can secure contributions from prior employers." It was also suggested that the employer protect himself by obtaining from the employee at the time of employment a statement of previous attacks of the disease which is naturally incident to the employer's business.

In discussing silicosis claims from the viewpoint of insurance coverage Kellogg (410) states:

> The principal difficulty is due primarily to the uncertainty existing as to the causes and progress of the disease and the difficulty of making proper diagnosis. The extent to which these difficulties will be solved will depend upon the method of adjudicating silicosis claims. Any method (whether common law or workmen's compensation) which depends primarily on the introduction of medical testimonies of not very thoroughly trained experts will lead only to "confusion worse confounded."
>
> The difficulty in respect to medical testimony is twofold. In the first place, with the present state of medical knowledge, there is ample opportunity for honest differences of medical opinion. But this same condition also gives opportunity for dishonest differences of medical opinion. Medical testimony (particularly when compensated on the contingent-fee basis) may be so warped as to be totally worthless. Where the legal procedure does not provide for medical examination before trial, the opportunity for dishonesty in medical testimony at the trial is greatly increased. Furthermore, mere objective physical examination of a claimant will not show the full picture. The past history of the claimant as to exposure to possible injurious dusts must be known. With a disease of such slow progress as silicosis, this may cover a period of several years and several different employments. Without adequate preliminary examination, both medical and as to past employment history, it is impossible to adequately prepare the defense against a claim of injury by silicosis, whether brought under the common law or in a workmen's compensation proceeding.
>
> Proper procedure for the adjudication of claims for silicosis must include the submission of every claim to a competent and impartial medical board. The claimant himself should be required to submit to physical examination, including X-ray examination. If the claim be made by the next of kin or dependents of the deceased employee, then there should be in each case an autopsy conducted by a medical man of experience in the diagnosis of silicosis. * * *.

The medical board, of course, should be a State-controlled agency. It should be independent, on the one hand, of the labor department of the State and, on the other hand, of the insurance carriers. But all three should cooperate toward a solution of the problems of prevention and control. For prevention and control are of far more value to everyone concerned, be he employee, employer, or insurance carrier, than is compensation. If the hazard can be materially reduced it will become an insurable risk.

Kellogg (410) states that enforcement should be in the hands of the controlling authority; he considers a method by differentials in insurance rates the most efficient. This would reward the employer who adopts advanced methods of control and prevention and would penalize the one who fails to do so — a much more effective method of enforcement than fining employers by court procedure.

Although such disproportion may not be warranted McCord (426) states that concern over health hazards in the foundry industry may be divided in the ratio of 99 percent of dusty-lung diseases and 1 percent for all others combined. In an article entitled, "Health Hazards in the Foundry", published in the National Safety News, January 1934, he discusses the following points which, although not major problems in connection with dust diseases, he considers important to the employment manager, safety engineer, and plant physician: (1) How shall the foundry operator protect himself against cases of dusty-lung diseases originating in other plants? (2) What shall be done with the worker known to possess dusted lungs? (3) Are some races more susceptible to dusty-lung diseases than others? (4) How necessary are dust counts in detecting hazardous work points in a plant? (5) What medical defense may be invoked in litigation? Under (5) he lists the following items which have been used or are in prospective use in preparation for defending silicosis compensation suits:

1. Denial of the existence of dusty-lung disease.- Recently in the examination of a sample of 202 films of men exposed and unexposed to dust, one was singled out as exceptionally free of even usual amounts of fibrosis. This film was examined as an unknown, as were all others. Later it was pointed out that the workman from whom this film was made was a litigant demanding a large sum of money on account of alleged silicosis. Similarly, about 4 out of 5 litigants alleging dusty-lung disease are in fact free of such diseases. The claims are spurious and may be proved so by appropriate examinations carried out by qualified investigators.

2. The denial of disability or prospective disability.- A large number of workmen whose lungs show some signs of dust action are not incapacitated, and no proof exists that real disability is an early prospect.

3. The denial of neglect.- Many of the true cases of dusty-lung disease have been developing over long periods of years, such as 15, 25, or 40. Since the medical profession has possessed scant knowledge of these diseases during these periods, it is unreasonable to believe that the industrialist could have possessed more.

Inevitably it follows that operators of dusty industries may not be presumed to have possessed earlier and greater information of these occupational diseases than physicians, industrial hygienists, State health departments, State factory inspectors, and other agencies devoted to health conservation. No industrialist may be charged with neglect for failure to supply protection against an insidious disease unknown or little known to the medical profession. Even at this time the average physician possesses meager information about these conditions.

4. The origin of the dusty-lung disease in previous employment.- Manifestly it is unjust that a few weeks of employment in some one foundry should be held responsible for a well-established dusty-lung disease when antedating this employment there have been years of exposure in similar work in other plants.

5. The origin of the dusty-lung disease from causes other than industrial employment.- In some localities it seems probable that sufficient dusts may arise from roads, farmwork, etc., to induce characteristic involvment of the lungs.

6. The actual quantity of dust present in an industry is below any reasonable threshold of probable production of damage.- The mere fact that an industry or department is classified as a dusty operation is not in itself proof of the possibility of development of pneumoconiosis. The nature and extent of protective devices may fully exculpate the plant as a practical hazard. Dust-count methods have certain undeniable limitations, but this form of testing along with tests of the efficacy of ventilating apparatus may be utilized on occasion wholly to eliminate any justification for contentions that air dustiness prevails.

7. Diseases other than pneumoconiosis may account for abnormal states in the lungs or other chest contents.- At least 10 other diseases may so simulate pneumoconiosis as to permit confusion and error. Among others are fungus diseases, tuberculosis, especially disseminated tuberculosis, cancer, syphilis, pleurisy with calcifications, certain types of unresolved pneumonia. In addition, claims are known to have arisen alleging pneumoconiosis when in fact the pathology centered about such unrelated conditions as aneurysm, mediastinal tumor, anaphylactic asthma, valvular heart disease, etc.

8. Silica is not a poison.- In some States claims at law must be based upon acts applicable only to poisonous substances. What constitutes a poison is a matter of definition. At the present time the best thought as to the action of silica within the lungs is unfavorable to acceptation of it as a poison. Primarily silica action is physical rather than chemical.

> 9. Pneumoconiosis does not constitute an accidental injury.- In some instances it has been contended that dusty-lung states are accidental injuries. Such specious arguments ordinarily are put forth in an effort to obtain compensation in political States where no provisions are made for occupational diseases. Every valid concept prompts the recognition of the pneumoconioses as occupational diseases.

According to McCord (426), of every hundred undisabled men properly examined a fair percentage is likely to present some degree of clear-cut pneumoconiosis. Many are not disabled; some are outstandingly hale and hearty. Shall they be told of their state? Many are likely to develop mental quirks and neuroses. Some will take an unfair advantage of the employer through claims. He epitomizes what he calls a small consensus of mature and fair-minded opinions as to appropriate action as follows:

> Seek to eliminate further exposure to the dust hazard. Do not apprize any undisabled workman of his condition. Make repeated X-ray examinations at about 6 months intervals. If advancement in the condition appears, then take action suited to the individual case and the respective State in which the cases may arise. Otherwise keep these men at some work.
>
> It is not maintained that this is a perfect line of procedure. Many ethical and moral considerations arise. A year or two hence an entirely different lot of concepts may govern the situation.

In a number of States commissions have been appointed in the last year or two to study compensation for industrial diseases, especially dust diseases.

The Special Industrial Disease Commission of Massachusetts (427) after a study of working conditions in 314 granite establishments and 225 foundries of that State made the following recommendations:

> Definitions.- Wherever used in these recommendation, the words here listed are defined as follows: (1) The "granite industry" shall include all establishments where granite or granitic rock is quarried, surfaced, polished or otherwise machined or finished; (2) the "foundry industry" shall include all establishments where ferrous or nonferrous metals are cast in sand molds; (3) "siliceous" dust shall mean dust containing either silica or silicates in amounts which may be harmful to health; (4) "harmful" shall mean capable of causing personal injury, as determined by the department of labor and industries; (6) "silicosis" shall mean that form of pneumonoconiosis caused by the inhalation of siliceous dust other than that of asbestos; (6) "asbestosis" shall mean that form of pneumonoconiosis caused by the inhalation of asbestos dust.

1. Preventive regulations.- That the Department of Labor and Industries be directed to prepare and issue, under authority of chapter 149 of the General Laws, rules and regulations specifically applicable to the granite and foundry industries for the protection of persons engaged in those industries from diseases caused by the inhalation of dust, such rules and regulations to emphasize (a) removal of the dust at the source wherever possible, (b) the obligation of employees to utilize, as required by the rules and regulations, such means of protection conforming thereto as are furnished to them, and (c) the requirements embodied in the following recommendations numbered 5 and 6.

2. Certificate of compliance with regulations.- That legislation be enacted to provide (a) that no person shall engage in any business to which the rules and regulations proposed in the preceding recommendation are applicable without a certificate of compliance with the rules and regulations, such certificate to be issued by the Department of Labor and Industries and to be revocable for cause, and (b) that the proposed statute become effective 9 months after the effective date of the rules and regulations.

3. Employers must provide insurance.- That the workmen's compensation act be amended to provide (a) that insurance under the act be compulsory, with respect to all employees whose employment involves the production of siliceous dust or exposure thereto, on all employers in the granite and foundry industries, these industries being particularly hazardous to the health of those engaged therein, and (b) that the above provision embodied in this recommendation may be extended to such other industries as the commissioner of labor and industries and the commissioner of insurance, acting jointly, may determine to involve a hazard sufficient to warrant such extension.

4. Insurers must carry certificated risks.-That legislation be enacted to provide that, as a condition precedent to the granting of a license to an insurance company to engage in workmen's compensation insurance business in this Commonwealth, it must agree (a) to insure any employer in the granite or foundry industry who is the holder of a certificate of compliance as provided in the recommendation next but one preceding and who, having applied for insurance to three insurance companies and having been rejected by them, is assigned to the licensee by the commissioner of insurance, and (b) to comply with rules and regulations to be made by the commissioner of insurance for the equitable distribution of occupational-disease losses in such risks above a fair proportion which shall be chargeable to the carrying company.

5. Entrance physical examinations.- That legislation be enacted to provide (a) that no person not previously so employed in the

Commonwealth shall engage in any occupation in the granite or foundry industry in which there may be harmful exposure to dust unless his physical fitness so to do has been determined, within the 12 months next preceding, by the Department of Public Health by means of an examination; (b) that any person not prohibited by statute or regulation thereunder from engaging in such occupation and who has not been so examined within the 12 months next preceding shall be given opportunity to be so examined within 30 days after filing with the department a written application including a signed statement that it is his purpose to engage in such an occupation; (c) that the examinee shall be notified in writing, within 10 days after such examination, whether or not he is found physically fit to engage in such an occupation; (d) that if an examinee found unfit files with the department within 10 days after such notification a written appeal from the finding, it shall be reviewed by the Medical Board of Review provided for in the following recommendation numbered 14, which board shall hold a hearing if requested by the examinee and shall render to the department a decision which shall be final and of which notice shall be sent to the examinee as hereinbefore provided; (e) that no member or employee of the department or of the board, nor any of their records, shall be subject to subpoena in connection with the case of any person so examined, nor shall any such records be made public except at a hearing as hereinbefore provided; (f) that there shall be issued to each examinee found physically fit to engage in such occupation a certificate of fitness which shall bear the signature of the examinee and the date of the examination and shall be duly executed under the direction of the commissioner of public health; and (g) that no further examination of the lungs shall be necessary as a condition precedent to such employment of a person to whom a certificate of fitness has been issued within the 12 next preceding.

6. Annual physical examinations.- That legislation be enacted to provide (a) that every person engaged in any occupation in the granite or foundry industry in which there may be harmful exposure to dust shall annually be examined by the Department of Public Health to determine his physical fitness to continue in any such occupation; (b) that no finding of such physical unfitness shall be made except on evidence of active pulmonary tuberculosis; (c) that every examinee found unfit so to continue shall be so notified in writing; (d) that if an examinee found unfit files with the above department within 10 days after such notification a written appeal from the finding, it shall be reviewed by the Medical Board of Review provided for in the following recommendation numbered 14, which board shall hold a hearing if requested by the examinee and shall render to the above department a decision which shall be final; (e) that, if the decision is contrary to the finding reviewed, the examinee shall be so notified in writing; (f) that, if the decision confirms the finding reviewed, or if an examinee found unfit fails to appeal as hereinabove provided, the Department of Public Health shall in writing notify the Department

of Industrial Accidents and the Department of Labor and Industries that the examinee has been found physically unfit to continue in any occupation as hereinbefore described and the last-named department shall so notify the examinee and his employer, if any; (g) that an examinee so found unfit may apply, not less than 12 months after such finding, for a reexamination in accordance with provisions (b), (c), (d), (e), and (f) of the recommendation next preceding, any certificate of fitness issued in such case to bear the word "readmitted"; (h) that any person who, having received notice of physical unfitness from the Department of Labor and Industries as hereinbefore provided, continues in any occupation for more than 30 days in contravention thereto or returns to such occupation except after readmission as hereinbefore provided, shall forfeit all rights to compensation for disability due to pulmonary disease under the workmen's compensation act; (i) that no member or employee of the Department of Public Health or of the Medical Board of Review, nor any of their records, shall be subject to subpoena in connection with the case of any person examined as hereinbefore provided, nor shall any such records be made public except at a hearing as hereinbefore provided; (j) that the division of tuberculosis of the Department of Public Health shall give special preference in the extension of its facilities to persons who, deprived of employment because of a finding of unfitness as hereinbefore provided, have been resident, in the Commonwealth on the effective date of this legislation or for 1 year prior to the date of such finding; (k) that the division of public employment offices of the Department of Labor and Industries shall give special preference in the extension of its facilities to the dependents of such persons; (l) that the division of public employment offices of the Department of Labor and Industries and the division of rehabilitation of the Department of Education shall give special preference in the extension of their facilities to such persons if subsequently restored to fitness for employment; (m) that every person who, having been deprived of employment because of a finding of unfitness as hereinbefore provided and being in need of relief or assistance, has been a citizen of the Commonwealth on the effective date of this legislation or for 1 year prior to the date of such finding shall, on having received compensation for disability due to pulmonary disease in the full statutory amount, or at once if ineligible for such compensation, be entitled to assistance as provided for by chapter 118A of the General Laws, as amended, irrespective of any provision thereof contrary hereto, for as long as such need and unfitness continue; and (n) that the official or body providing such assistance may at any time require that any such person be reexamined, as hereinbefore provided, in order to determine whether or not the unfitness continues.

7. Compensation for pulmonary disability restricted.- That the workmen's compensation act be amended to provide (a) that no person who has previously received compensation for disability due to pulmonary disease, either in total statutory amount or in a lump sum under

final adjudication, shall again be eligible for compensation for disability due to any such disease and (b) that, except in cases pending before the Industrial Accident Board on the effective date of this legislation, no person who has not been a resident of the Commonwealth for the 5 consecutive years immediately preceding the date of injury shall be eligible for compensation for disability due to silicosis or asbestosis.

8. All persons exposed subject to preventive regulation.- That chapter 149 of the General Laws be so amended as clearly to authorize the Department of Labor and Industries (a) to make such investigations, determinations, rules, regulations, and orders as are necessary to the protection of the health and safety of all persons engaged in any employment, as defined in section 1 of that chapter, and (b) to make such investigations, determinations, rules, regulations, and orders as are necessary to the protection of the health and safety of the public with respect to such employments.

9. Physicians' reports paid for, privileged.- That section 11 of chapter 149 of the General Laws be amended to provide (a) that the Department of Labor and Industries shall pay a fee of 50 cents for each report of disease made pursuant to the provisions of that section and (b) that no such report shall be subject to subpoena, nor shall its contents be made public.

10. Schedule and experience rating for occupational-disease risks.- That legislation be enacted to authorize the commissioner of insurance to approve or disapprove plans for computing premiums for an individual employer whose employees are exposed to dust or other occupational disease hazards, according to the existence and effectiveness of machines or devices designed to remove or reduce such hazards.

11. Cancellation of policies restricted.- That legislation be enacted to provide that no workmen's compensation insurance policy shall be subject to cancellation by either party on less than 30 days' notice in writing.

12. Division of Occupational Hygiene.- That legislation be enacted to provide for the establishment, in the Department of Labor and industries, of a division of occupational hygiene, with a director, such personnel having special knowledge of the causes and prevention of occupational disease and such additional staff and facilities as may be necessary to the efficient performance of its duties, which shall be (a) to investigate conditions of occupation with reference to hazards to health and to determine the degree of such hazards, (b) to investigate and evaluate means for the control of such hazards, (c) to assist in the preparation of rules and regulations for the prevention of occupational accidents and disease, and (d) in cooperation with the Department of Public Health to promote occupational health and safety education.

13. Occupational medical staff.- That legislation be enacted to provide that there be added to the personnel of the division of adult hygiene of the Department of Public Health a medical staff and such assistants and facilities as may be necessary to the efficient performance of their duties, which shall be (a) to investigate and report to the Industrial Accident Board on the medical aspects of all cases coming before the board for compensation for silicosis, asbestosis, or pulmonary tuberculosis and to so investigate and report in such cases coming before the board for other occupational diseases as the board may refer to them, their reports and findings to be admissable as evidence before the board or any member thereof, but no member or employee of the department to be subject to subpoena in connection therewith, (b) in any fatal case coming before them to order an autopsy if in their opinion it is advisable for the purpose of determining a fact material to any party at interest, (c) to make such findings of physical fitness as are provided for in the preceding recommendations numbered 5 and 6, (d) to study the effects upon health of materials and processes used in industry, in connection with which studies no member or employee of the department shall be subject to subpoena, and (e) in cooperation with the Department of Labor and Industries to promote occupational health education.

14. Medical Board of Review.- That legislation be enacted to provide for appointment by the Public Health Council of a board of three physicians, 1 to be a clinical pathologist, 1 a roentgenologist, and 1 a specialist in diseases of the chest, to be designated as the Medical Board of Review, whose members shall serve and be compensated on a per-diem basis and whose duties shall be (a) to review, on request by the Industrial Accident Board, reports and findings of the Department of Public Health provided for with respect to compensation cases in the recommendation next preceding, and (b) as provided in the preceding recommendations numbered 5 and 6 to review findings of physical fitness made by the Department of Public Health, hold hearings, and render decisions thereon.

15. Statistical data.- That legislation be enacted to direct and enable the Department of Industrial Accidents to prepare from its records, as a factual basis for preventive regulation by the Department of Labor and Industries, statistical data on occupational injuries.

The Medical Committee of the Pennsylvania Commission on Compensation for Occupational Diseases (425) paid special attention to miners' asthma and silicosis because it was believed that a large number of claims for compensation would be made for these diseases; also they represent peculiar problems because of their slow development over a period of years with different degrees of disability incident to particular stages of development. Miners' asthma is peculiar to the coal-mining industries, whereas silicosis may arise from the breathing of silica dust in industries other than coal mining or mining of any sort. They are related basically, however, as dust diseases, and miners' asthma is frequently involved with silicosis. In connection with silicosis the committee recommended the following:

> For the purpose of compensation silicosis shall be considered a disease of the lungs, due to breathing air containing silica (SiO_2) dust, characterized anatomically by generalized fibrotic changes in both lungs, with a development of miliary nodulation, demonstrable by X-ray examination.
>
> The disease is divided arbitrarily into first, second, and third stages for convenience of description and possible compensation purposes.
>
> Silicosis, at any stage, when complicated with active pulmonary tuberculosis, shall be deemed total disability; in the absence of such infection only second and third stages shall be compensable.
>
> In order to establish a claim for compensation for silicosis, the claimant must have had the equivalent of 2 years' aggregate employment in the State of Pennsylvania, all occurring after the passage of the act, in an occupation or occupations recognized as involving exposure to silica dust.

Although the term "chronic incapacitating miners' asthma" was not considered entirely satisfactory or scientific it was used to indicate an affection well-recognized under that title in the coal fields by the laity and the medical profession and to represent the chief disability resulting from anthracite mining. The committee (425) pointed out that the term indicates a disabling consequence rather than the underlying causative condition and is therefore a symptom complex rather than a pathological entity. Inclusion of anthracosis itself as a compensable disease was not considered feasible because of its prevalence. The committee considers that miners' asthma incident to anthracite mining is of very great moment in the industry but that there is no comparative experience in any other State or country which would be of use in determining the extent of the disease as a compensable condition. The effect of soft-coal mining upon mine workers is different from that of anthracite mining.

The Medical Committee (425) concluded that there is a disabling occupational disease of the character of chronic incapacitating miners' asthma but, owing to the lack of precise information as to the exact nature and prevalence of the disease, recommended that a further study and investigation be made of occupational diseases among anthracite miners. In any case, it recommended that in order to establish a claim for compensation for chronic incapacitating miners' asthma the claimant must have had not less than 5 years' aggregate employment in the coal-mining industry of Pennsylvania, 2 years of which must have followed the passage of an act.

As a result of its inquiry the Medical Committee (425) concluded that approximately 22 percent of the whole group of miners are suffering from miners' asthma and are either partly or totally disabled thereby, the more active symptoms being incident to the miners engaged in rock drilling wherein the dust inhaled contains silica.

The Medical Committee (425) observed that the decisions of compensation tribunals and courts were replete with statements that persons familiar with the complexities of the subject -- diseases and pathological conditions -- could readily recognize as incorrect to the point of absurdity. It was therefore recommended that a medical board be created to assist in the operation of the act and that its findings as to whether certain conditions from which the claimant was suffering were due to an occupational disease caused by given employments should be final. Furthermore, this board should keep abreast of the development of understanding in relation to occupational diseases and from time to time make recommendations relative to the inclusion or exclusion of diseases from the list of those made compensable. The qualifications of such a board were also discussed by the committee.

Jones (428) emphasizes that the only solution of the silicosis problem lies in prevention, as the cost of compensating for it is too great for industry, however it is paid. He states:

> From what I can learn the disease now known as silicosis is as old as history. But whether because of a recent increase through the use of modern machinery or because of a growing public recognition of its seriousness, or because of these two factors in conjunction, and possibly others also, silicosis has now become a mortal menace to industry. Whether under a system of employers' liability for damages or under a system of compensation -- "regardless of fault" -- for occupational diseases, the cost of silicosis is becoming so heavy as to entail the rapid or gradual ruin of many industries, unless the incidence of the disease can be radically reduced. And cure of silicosis, once it has progressed beyond a very early stage, is, according to the preponderance of medical opinion, practically out of question. Consequently for silicosis, prevention is most emphatically the primary and principal problem.
>
> That problem has engineering, medical, economic, legal, educational, and political aspects -- all of which need to be realized by all concerned in the task of prevention.
>
> In its engineering aspects the principal problem in prevention of silicosis is the removal of or prevention of inhalation of dust. As a layman I cannot imagine how, practically, all dust can be removed or kept from inhalation. Therefore, primarily at least, efforts should probably be directed principally to the elimination of harmful dusts. Here you are confronted with several difficulties.

The preponderance of medical opinion is that, of the organic[4/] dusts constantly generated in industry, only dust of free silica (silicon dioxide) and perhaps asbestos dust -- and these dusts only when in minute particles -- are harmful -- that is, harmful in the sense and to the extent of causing specific disabling diseases of the lungs. But that is merely a majority opinion, from which there are dissents; and it is open to doubt. Only a few months ago a high authority on this subject in Great Britain declared:[5/] "We need a scientific 'recessional' in which to reexamine with an open mind many of the generalizations now accepted as current coin in relation to silicosis and 'miners' phthisis.'" Moreover silicosis is -- in colloquial language -- "all mixed up with" tuberculosis. Apparently tuberculosis may be caused by organic[4/] dust or, for all that I can learn to the contrary, may be indirectly activated by other dusts. Consequently how far all dust, or, if not all, then what dusts, imperatively need to be eliminated is, as yet, a problem to be determined largely by experimentation, not based _a priori_ on present medical opinion, but on the results of experience -- on the results in the way of reducing morbidity from the use of specific means of prevention.

A problem of vital importance in the study of engineering means of prevention is the determination of what is practicable -- economically and humanly. Economically, the best means of prevention may often be impracticable. Industry cannot afford to be continually replacing its machinery to experiment with the latest gadgets. It would be a jump out of the frying pan into the fire to load an industry to death to prevent exposure to an occupational disease. And some means of prevention may be such that the workmen simply cannot be induced to use them properly and consistently. This problem will be particularly acute in the smaller undertakings. What is practicable in large and well-organized establishments is often impracticable in minor operations. Thus in the prevention of lead poisoning, the well-established paint factories have been almost completely successful, whereas among the job painters the incidence of that disease has been very little reduced. Results will probably be similar as to silicosis. In South Africa, where silicosis seems to be concentrated principally in mines, generally large establishments, measures of prevention are succeeding in reducing the incidence of the disease encouragingly. But in Cumberland County, New South Wales, where a scheme of compensation for silicosis applicable to such small-job trades as quarrying, rock drilling, sewer excavation, etc., is in force, it seems that little progress in prevention is being made, though strenuous medical means are resorted to. It may turn out to be a job for engineers to discover means for prevention of silicosis practicable for the "little fellow." At least that is a point which will require your study.

[4/] Should be "inorganic"?

[5/] Cummins, S. L., adviser to the British Tuberculosis Research Committee, quoted in Ind. Med., vol. 3, no. 4, 1934, p. 264.

This question of what is practicable, as distinguished from the ideal, leads up to another aspect of the matter. In my opinion, besides studying the best practicable ways and means for prevention, engineers should also give consideration to the formulation of minimum standards and to ways and means for procuring their observance. Authoritative formulation of such standards is needed for many purposes -- to impress backward industrialists, to guide and support insurers in granting or refusing coverage, and to furnish a scientific basis for regulations to be enforced by public authorities. A code of such standards needs to be elaborate, so as to fit different conditions, and to be open to continual revision, so as to keep abreast with the developments of research and experience.

Virtually every meeting called to consider ways and means of preventing injury to persons employed in industrial pursuits has devoted part of its program to discussion of occupational-disease problems but in nearly every instance from the medical viewpoint. Because of the close relationship between prevention of industrial accidents and prevention of occupational diseases, Ainsworth (413) states that standardization should play an equally important part in the solution of problems arising in the prevention of occupational diseases.

National standardization in the prevention of accidents developed through the necessity for bringing order out of the confusion resulting from the great number of conflicting requirements, rules and regulations, practices, and recommendations which have been prepared and enforced or recommended by the various regulatory bodies, insurance groups, trade associations, accident-prevention organizations, and others throughout the country. Bringing together around a common table the various groups, which as separate units had prepared their own accident-prevention recommendations, to iron out their differences and express their points of view, according to Ainsworth (413) has resulted in establishing authentic methods for the prevention of industrial accidents. Therefore, to prevent the same confusion in technical requirements for the prevention of occupational diseases which came about through lack of a proper national clearing house of information in the field of accident prevention, such a clearing house charged with the development of minimum standards in this particular field should be organized at the earliest possible date. Hatch (429) proposes a national board to review rules and methods and to prepare at stated intervals, for the assistance of State officials, standards of good practice for various dusty processes and industries. This program has been suggested to the American Standards Association by the sectional committee charged with developing a safety code for exhaust systems (413). As a part of this recommendation the committee suggested the appointment of a national advisory board, composed of experts in the prevention of occupational diseases, to correlate the technical knowledge now available. The work of this committee, according to Ainsworth (413), might be developed through extensive research and practical experience so that it could furnish sound technical information on the best ways and means of preventing health hazards, from the national point of view, to technical committees organized under the procedure of the American Standards Association for the development of standards to eliminate industrial health hazards, which they in turn could give to regulatory bodies and industrial concerns. He states that the symposium held by the Safety Committee of the American Society of Mechanical Engineers undoubtedly has brought more clearly to mind the importance of the engineering aspects of the solution of problems relating to the prevention of occupational diseases and has supported the theory that proper machinery should be established for the development of authoritative national standards with which to assist the engineer in carrying on his part of the prevention program.

According to Cranch (430), in extending compensation coverage to occupational diseases it must be recognized that whatever method is pursued the subject is much more complex than that of accidents. Expert medical information is essential in administration and must be available from an impartial source to the board or commission responsible. The ultimate cost of such coverage is also quite a problem; as costs have steadily increased for coverage of accidents, despite the presumed clear-cut nature of an accident, only a guess can be made as to what the relative increase in costs would be for occupational disease.

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